3-1-2018

Who Benefits From Economic Development Incentives? How Incentive Effects on Local Incomes and the Income Distribution Vary with Different Assumptions about Incentive Policy and the Local Economy

Timothy J. Bartik
W.E. Upjohn Institute, bartik@upjohn.org

Citation

Bartik, Timothy J. 2018. "Who Benefits From Economic Development Incentives? How Incentive Effects on Local Incomes and the Income Distribution Vary with Different Assumptions about Incentive Policy and the Local Economy." Upjohn Institute Technical Report No. 18-034. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

WHO BENEFITS FROM ECONOMIC DEVELOPMENT INCENTIVES?

How Incentive Effects on Local Incomes and the Income Distribution Vary with Different Assumptions about Incentive Policy and the Local Economy

Timothy J. Bartik
W.E. Upjohn Institute for Employment Research

Upjohn Institute Technical Report No. 18-034

March 2018

PROMISE
INVESTING IN COMMUNITY
a project of the W.E Upjohn Institute

W.E. UPJOHN INSTITUTE
FOR EMPLOYMENT RESEARCH

300 S. Westnedge Ave. Kalamazoo, MI 49007-4686
http://www.upjohn.org

I appreciate comments by Owen Zidar and Jeff Chapman on a precursor paper to the present report, as well as comments by my Upjohn colleagues. I also appreciate specific comments on the detailed model and checks of its calculations by Jeff Chapman, Peter Wu, and Mark Robyn. I appreciate other research assistance and editing for this report by Nathan Sotherland, Claire Black, and Ben Jones. Research for this report was supported in part by Pew Charitable Trusts. The findings and opinions expressed in this report are those of the author and should not be interpreted as reflecting the views of those commenting on the report or assisting in its completion, or as reflecting official views of Pew Charitable Trusts or the Upjohn Institute.

TABLE OF CONTENTS

FIGURES

TABLES

Who Benefits from Economic Development Incentives?

How Incentive Effects on Local Incomes and the Income Distribution Vary with Different Assumptions about Incentive Policy and the Local Economy

Upjohn Institute Technical Report No. 18-034

Timothy J. Bartik
W.E. Upjohn Institute for Employment Research

ABSTRACT

This report presents results from a simulation model that examines the effects of economic development incentives (e.g., tax incentives such as property tax abatements or job creation tax credits) provided to businesses by state and local governments in the United States. The model simulates effects of incentive policies on the incomes of local residents, both for different income types (e.g., labor income versus property income) and for different income quintiles, under different assumptions about the economy's workings and public policy. Net benefits of incentives for local incomes are greater if the incentives have greater job-creation effects conditional on their effects on business costs, and in particular if incentives have multipliers as great as have sometimes been estimated for high tech manufacturing. Incentive design and financing is also key. If tax incentives are replaced with customized services (e.g., customized job training) that are as productive as has sometimes been estimated, net benefits increase enormously, and in a progressive manner. The opportunity costs of how incentives are paid for—what taxes are increased or what spending is cut—also matter a great deal. For example, financing incentives by cutting back on productive services such as K–12 education has very negative effects on local incomes and highly regressive effects on the income distribution. Who gets the jobs matters: local incentive benefits increase, particularly for low- and middle-income groups, if a greater proportion of the jobs go to the local nonemployed rather than in-migrants. Finally, refocusing incentives on locally owned businesses has effects that vary enormously under different assumptions about who is assisted and how they are assisted.

JEL Classification Codes: R58, H71

Key Words: Business tax incentives; state and local economic development policy; simulation models; K–12 education; state and local business taxes; labor market policies

Acknowledgments:
I appreciate comments by Owen Zidar and Jeff Chapman on a precursor paper to the present report, as well as comments by my Upjohn colleagues. I also appreciate specific comments on the detailed model and checks of its calculations by Jeff Chapman, Peter Wu, and Mark Robyn. I appreciate other research assistance and editing for this report by Nathan Sotherland, Claire Black, Janelle Grant, and Ben Jones. Research for this report was supported in part by Pew Charitable Trusts. The findings and opinions expressed in this report are those of the author and should not be interpreted as reflecting the views of those commenting on the report or assisting in its completion, or as reflecting official views of Pew Charitable Trusts or the Upjohn Institute.

W.E. UPJOHN INSTITUTE

PROMISE
INVESTING IN COMMUNITY
a project of the W.E Upjohn Institute

MARCH 2018

EXECUTIVE SUMMARY

Economic Development Incentives

Who Benefits? Who Pays the Costs? How Can They Be Improved?

Timothy J. Bartik, W.E. Upjohn Institute

Incentives' budget costs may lead state and local governments to neglect education.

Over the past quarter century, state and local business tax incentives to promote economic development have tripled in size (Bartik 2017). Recent incentives have been shockingly large. In 2017, Wisconsin provided Foxconn, an electronics manufacturer, with incentives of up to $4.5 billion. Are incentives a good way to increase the incomes of local residents? Or are incentives excessively costly?

The positive case for incentives is that their job creation effects will provide large local benefits. With more local jobs, local residents will enjoy greater employment and wages. Local growth will increase local property values. More jobs may yield "fiscal benefits"—increases in tax revenue that exceed growth-induced increases in public spending.

The negative case against incentives is their potentially large costs. Incentives' budget costs may lead state and local governments to neglect public services, such as K–12 education. Investing in the skills of local residents might be a better strategy to promote local prosperity.

This executive summary, based on my report (Bartik 2018), describes the results from a simulation model of incentives. Using empirical parameters from the research literature, the simulation model examines how incentives' benefits—and costs—are divided among local residents at different income levels. The model examines how incentives' benefits and costs change if incentives are targeted at different types of firms, or if they are designed and financed differently.

Based on this model, the typical incentive package in the typical state has benefits and costs of almost the same size. Jobs are created, but only in a minority of incented firms. Of the jobs created, only a modest proportion increase the employment of local residents. Financing incentives by cutting education spending has large costs, because it reduces future wages. Cuts in education spending have particularly large costs for low-income groups.

But as this model shows, incentives can be improved by reforms:

- Target incentives at firms with high job multipliers.
- Target firms that pay a high wage premium.
- Target created jobs at the local unemployed.
- Minimize long-term incentives.
- Don't finance incentives by cutting education spending.
- Finance incentives by increasing taxes on out-of-state business owners.
- Focus less on tax incentives and more on incentives that are customized services to small and medium-sized businesses, particularly locally owned businesses.

In sum: tax incentives should be limited by being targeted and up front. Tax incentives should not sacrifice a broader economic development strategy, which includes investing

---

For additional details, see the full report, *Who Benefits from Economic Development Incentives?* at http://research.upjohn.org/up_technicalreports/34.

A typical incentive program only induces the creation of about 10 to 15 percent of the incented jobs.

in skills and in services that help small and medium-sized businesses. These lessons from the simulation model should be absorbed by state and local policy makers.

BACKGROUND ON INCENTIVES

Economic development incentives are tax breaks or business services that are customized to the individual business. Incentives are intended to encourage that business to locate or expand or retain jobs in a state or local economy.

Typical incentives of state and local governments have a magnitude equal to 2 to 3 percent of the firm's wages, averaged over the life of the investment.[1] Some states provide incentives that are three times greater.

The largest type of incentive is job creation tax credits. The second largest type is property tax abatements. Other tax incentives include investment and research and development (R&D) tax credits. Most tax incentives go to large corporations.

Over 90 percent of incentives are tax incentives. But other incentives may consist of customized business services. Such services include

- customized job training—often provided by community colleges and tailored to the firm's needs;
- manufacturing extension services—advice on improving technology, productivity, and sales;
- small business development centers.

These customized services are of most use to small and medium-sized businesses.

Incentives are front-loaded, but they also persist. In the first year of the incented investment, typical incentives are 7 percent of wages. Incentives persist at 2 or 3 percent of wages from Years 2 through 10 of the investment before tailing off.

Incentives are mostly targeted at export-base businesses. "Export-base" firms are those that sell goods and services outside the state or local economy. Most manufacturing firms are export-base firms, but so are some service firms. Targeting incentives at export-base firms brings new dollars into the state. These new dollars have multiplier effects on other local jobs: the new dollars will be respent by export-base firms on local suppliers, and workers at export-base firms and suppliers will respend their paychecks at local retailers. In contrast, incenting non-export-base firms may hurt sales and jobs at competing non-export-base local firms.

But except for targeting export-base firms, incentives are not otherwise targeted. Incentives do not vary much with a firm's wages, or with whether the firm is high-tech. Nor do they vary much with a state or local economy's unemployment rate.

THE MODEL'S WORKINGS

The model simulates the effects of incentives handed out in a given year on the incomes over the next 80 years of local residents.[2] The simulation uses estimates from the empirical literature.

Based on research about how taxes affect business location decisions, the model assumes that a typical state incentive program, of 2 to 3 percent of wages, only induces the creation of about 10 to 15 percent of the incented jobs.[3] "But for" the typical incentives, the probability of the incented jobs choosing the state would have been reduced from 100 percent to 90 or 85 percent.[4]

---

1. Statements in this section about typical incentives are based on the incentives database described in Bartik (2017).
2. This lengthy 80-year follow-up is needed to allow for the full effects on local economies of incentives being financed by education spending cutbacks, whose main effect is on the wages of the next generation. See further discussion later in this executive summary.
3. The research that backs up the model's assumptions about various empirical parameters is detailed in the full report, Bartik (2018).

The direct budget costs of incentives significantly exceed their fiscal benefits.

A typical "jobs multiplier" is assumed of 2.5. For each job created by the incentives, 1.5 additional jobs are created in local suppliers and retailers.

Created jobs must increase either the local employment-to-population ratio or the population. Based on research, the model assumes that in the short run, about two-thirds of the jobs go to the local nonemployed and one-third to in-migrants. In the long run, about 15 percent of the local jobs created increase the employment rates of local residents, and 85 percent of the jobs increase the population through migration.

Moderate increases in local employment-to-population ratios will modestly increase local real wages, local housing prices, and other local prices. Higher local wages and prices have some moderate negative feedback effects in reducing other local jobs.

Based on research, state and local tax revenue will go up slightly slower than the percentage growth in jobs. State and local public spending needs are assumed to go up the same percentage as population. Because population growth eventually goes up almost as much as job growth, fiscal benefits are slight.

As a result, the direct budget costs of incentives significantly exceed fiscal benefits. The net fiscal costs of incentives are assumed to be financed half by spending cuts and half by tax increases. Based on typical state and local budgets, 22 percent of spending cuts reduce K–12 spending. Based on typical state tax systems, 44 percent of tax increases are business tax increases.

This financing of incentive costs has "demand-side" effects, in that it reduces either public or private spending on local goods and services. There also are "supply-side" effects, due to how taxes and public spending affect the quantity or quality of the supply of local labor and capital.

Of the public spending cuts, only cuts in K–12 spending are assumed in the model to have supply-side effects, by reducing local skills. A 10 percent cut in K–12 spending will reduce long-run wages by 8 percent (Jackson, Johnson, and Persico 2016). These wage effects are adjusted downwards to only include former K–12 students who stay in the local economy.

Of the increased taxes, only increased business taxes are allowed in the model to have supply-side effects. Based on research, a 10 percent increase in state and local business taxes is assumed to reduce private jobs by 5 percent in the long term.

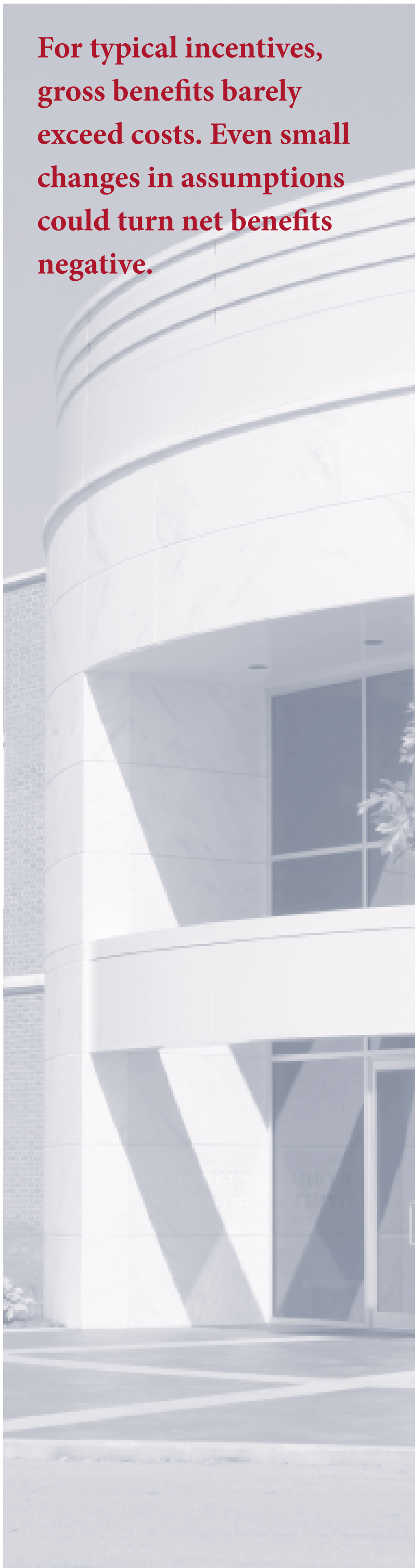
The model's effects on different types of income are divided across "income quintiles." Households are ordered by household income and put into five income groups of equal population.

Based on research, the increased employment rates and wages due to local job creation are distributed progressively: the bottom three income quintiles have a percentage gain in income of about three times that of the top two income quintiles. Property-value gains disproportionately benefit upper-income groups. Higher state and local taxes and lower public spending are regressive; state and local taxes account for a higher percentage of income for lower-income groups, and state and local public spending has larger percentage effects on lower-income groups. Cuts in K–12 spending are highly regressive, as low-income children are particularly harmed by lower public-school quality.

INCENTIVE EFFECTS ON INCOMES OF LOCAL RESIDENTS UNDER BASELINE ASSUMPTIONS

What effects does a typical incentive program have on local residents' incomes? This typical incentive program is characterized by the following baseline assumptions:

4. This likely effect of incentives on location decisions is far less than is often claimed by economic development policymakers. Often, the claim is made that almost all of the incented business activity would not have located in a state or local area "but for" the incentives. However, this common claim is not backed by the empirical literature. See Bartik (2018) or Jensen (2017). Intuitively, incentives of 2 to 3 percent of wages do not loom large compared to many other costs that vary quite a bit more across local areas, such as worker productivity or wages.



For typical incentives, gross benefits barely exceed costs. Even small changes in assumptions could turn net benefits negative.

- Incentives only to export-base firms.
- A multiplier of 2.5.
- Average wages in incented jobs.
- Local nonemployed get 15 percent of the created jobs.
- Typical time pattern of U.S. incentives: modestly front-loaded, but still large payouts up through 10 years.
- Costs of incentives are financed half from spending cuts, half from tax increases. Spending cuts and tax increases are divided among spending and tax categories based on average state budget patterns.
- Large businesses owned out-of-state receive the incentives.

Later we consider alternative incentive policies, which modify these assumptions.

Using baseline assumptions, Table 1 reports the effects on local incomes of different types. What is reported are effects on the present value of income, summed over 80 years since the location decision. Effects are stated as a percentage of the present value of incentives' direct financial costs. Effects on different income types sum to net overall benefits.

Net benefits of incentives are 22 percent of incentive costs. Gross benefits barely exceed costs: the benefit-cost ratio is 1.22. Even small changes in assumptions would turn net benefits negative.

The most important component of net benefits is higher earnings due to higher local employment-to-population ratios (83 percent of incentives' financial costs). Who gets the jobs matters. But other income effects also matter.

Fiscal costs for local residents are reduced to 64 percent of incentive costs by two factors. First, tax revenues from new jobs exceed costs from more population. Second, incentives are partly financed by higher business taxes; most such taxes are "exported" to out-of-state business owners, which benefits local residents because they do not pay such costs. However, despite these offsetting factors, incentives still have net fiscal costs.

Lower future wages due to education cutbacks exceed 38 percent of the direct dollar costs of incentives. This wage loss is remarkably large, given that in the baseline, only 11 percent of incentives' costs are paid for by reducing K–12 spending.

Higher real wages help local workers, and higher property values help local property owners. But higher local input prices also reduce profits of locally owned businesses.

Table 1 Baseline Incentive Effects, by Type of Income

Net fiscal costs	−64.3	= Direct incentive costs	−100.0
		+ Fiscal benefits from revenues exceeding costs	23.2
		+ Benefits for local residents from exported business taxes	12.5
Direct labor market benefits	102.6	= Earnings increases from higher employment-to-population ratios	82.9
		+ Earnings increases from higher real wages due to tighter labor markets	19.7
Property value gains	28.8		
Local wage losses due to education cutbacks	−38.1		
Profit effects on locally owned businesses	−6.7		
Net benefits	22.3		

NOTE: Derived from Table 4 in Bartik (2018). Incentive effects are stated as the present value of incentive effects on different types of local income, divided by the present value of incentives' financial costs and expressed as a percentage. The present-value figures are calculated by summing effects of incentives over the 80 years after the incentives are awarded and the location decision occurs. A 3 percent real discount rate is used in calculating present values. Net benefits at bottom sum all effects in that column.

A striking result is that typical incentives cause the bottom-income quintile to lose income. This low-income group suffers large losses from incentive-induced cuts in public school spending.

With all these various benefits and costs, net benefits of incentives end up being slight relative to incentive costs. Incentives do have large labor market benefits, fiscal benefits, and property value benefits. But they also have large financial costs and costs due to reduced education spending.

Table 2 shows how a typical incentive policy affects different income "quintiles." Before the policy, the lowest-income quintile receives only 5.1 percent of total household income, whereas the highest-income quintile receives 52.0 percent of total income.

In the next row, the total net income effect of 22.3 percent of incentive costs is divided among the income quintiles. The striking result is that the bottom-income quintile loses income. So does the second-highest-income quintile (Quintile 4). The other three income quintiles gain.

The next row calculates quintile effects as a percentage of the total net income gain. In the last row, these percentages are divided by baseline quintile income shares, to see whether a quintile gains more or less than its baseline share. The middle-income quintile gets almost half of the total net income gain, which is almost four times its baseline share. The richest-income quintile (Quintile 5) and the second-lowest-income quintile (Quintile 2) also gain more than baseline shares, but only slightly. Incentives redistribute from the lowest-income quintile and the second-highest-income quintile to the middle-income quintile.

Table 2 Baseline Incentive Effects, by Income Group

		Quintile				
	Total	1	2	3	4	5
Quintile income baseline share (in %)	100.0	5.1	9.2	13.7	20.0	52.0
Total net incentive effects on income, as % of overall incentive costs	22.3	−3.1	2.3	11.2	−2.4	14.4
Total net effect for each quintile as % of total net effect	100.0	−13.8	10.3	49.9	−10.6	64.2
Proportional effect relative to baseline income share	1.0	−2.7	1.1	3.6	−0.5	1.2

NOTE: Derived from Table 6 of Bartik (2018). Income groups are derived by ordering households by income, and then dividing into five groups of equal population size, as described in Bartik (2018). The baseline income share shows each quintile's share of income before the incentive policy, expressed as a percentage of total household income. The next row shows the effects of incentives on the present value of income of each group, where these effects are "normalized" by being divided by the present value of incentives' financial costs. The quintile figures in this row sum to net overall benefits of 22.3 percent on left. The third row divides the income effect of each income quintile by the overall effect and expresses this result in percentage terms. The fourth row divides this percentage effect by the baseline income percentage of each income group. If this number is greater than 1, it means the group is gaining more than its baseline income share, which necessarily implies that the percentage gain in income for this group exceeds the overall average percentage gain.

What causes these distributional effects? In Table 3, this question is addressed by breaking down effects by both quintile and income type. The effects on each type of income for each quintile are expressed as a percentage of incentives' total direct financial costs.

The lowest-income quintile loses because it suffers disproportionately large losses from cutbacks in public school spending. In addition, the lowest-income quintile pays a disproportionate share of budget costs, because state and local tax systems are regressive. These budget effects on the lowest-income quintile, both immediate and long-term, more than offset the above-average labor market benefits for the lowest-income quintile.

The middle-income quintile has relative gains because labor market benefits for this group are still above average, as this group has many workers gaining from higher employment rates and wages. In addition, the middle-income quintile does not, compared to the lowest-income quintile, proportionately lose as much from tax increases and education cutbacks.

The highest-income quintile gains disproportionately from incentive-induced increases in property values.

Table 3 Baseline Incentive Effects, by Income Group and Income Type

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.0	5.1	9.2	13.7	20.0	52.0
Total net income effects	22.3	−3.1	2.3	11.2	−2.4	14.4
Net local budget costs	−64.3	−6.8	−8.0	−9.9	−12.3	−27.2
Labor market benefits	102.6	12.0	17.5	26.7	13.8	32.6
Property-value benefits	28.8	0.9	1.4	1.9	3.4	21.2
Education cutbacks	−38.1	−9.0	−8.4	−7.3	−6.8	−6.6
Local business effects	−6.7	−0.1	−0.2	−0.2	−0.4	−5.7

NOTE: Derived from Table 6 of Bartik (2018). The first row in the table shows the baseline income of each quintile, before any incentives, expressed as a share of total household income. The other entries in the table show the incentive effects, under baseline assumptions, on the present value of each type of income for each quintile. The effects are "normalized" by being divided by the total present value of incentives' financial costs, and are reported as a percentage of these total costs. The quintile entries for each row sum to the total on the left. The income-type entries for each column sum to the total net income effect in the second row.

The second-highest-income quintile (Quintile 4) loses because labor market benefits of local job growth drop off sharply at this point in the income distribution. For Quintile 4, budget costs and education cutbacks are burdensome, and property value gains and the reduced labor-market benefits are insufficient to overcome these costs.

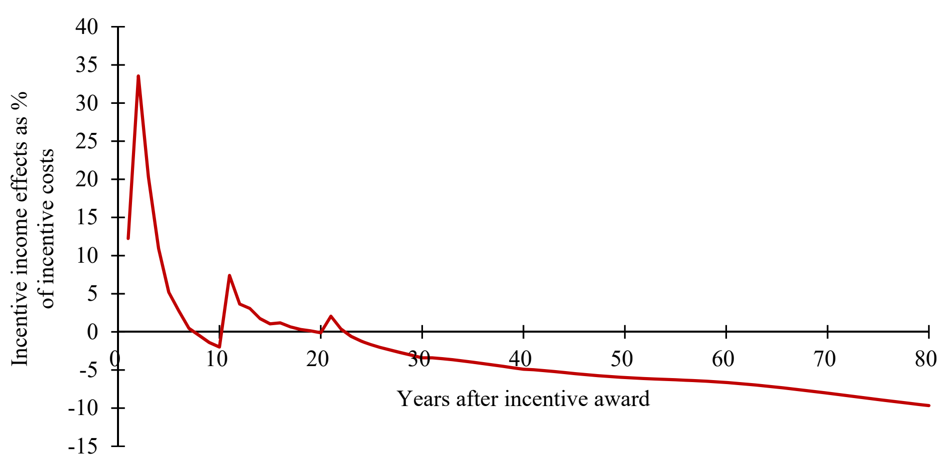
The highest-income quintile gets net benefits largely because it gains disproportionately from increased property values. Also, budget and education cutbacks are not quite as large for this income quintile relative to its baseline share.

The second-lowest-income quintile, Quintile 2, gains modestly because it is somewhat in-between the lowest-income quintile and the middle-income quintile in its income sources.

How do incentive effects vary over time? Figure 1 shows effects on overall net local incomes in each year after the incentive award. Effects in each year are stated as a percentage of the present value of incentives over the entire period.

In the short-run, incentives yield net benefits because of higher employment rates. In the long run, the increased employment rates depreciate due to in-migration. This lowers fiscal benefits.

Figure 1 Baseline Annual Income Effects of Incentives



NOTE: Derived from Table 5 of Bartik (2018). The annual effects on net income of local residents in each of the 80 years after incentives are awarded are "normalized" by being divided by the total present value of incentives' financial costs over the entire 80 years. The annual net income effects are in real terms for each year, but are not discounted.

The full wage losses due to incentive-induced cuts in education spending occur only after a generation.

TRANSLATING THE REPORT'S ESTIMATES INTO AGGREGATE EFFECTS

What do this report's estimates mean for the potential *aggregate effects* of incentives?

Suppose a state was very aggressive in its use of incentives. Specifically, suppose that each year, the state's incentives added up to about 1 percent of state personal income. This is about 3.4 times the incentive usage of the average state, which averages 0.3 percent of personal income.[1] But some states have in the past run incentives at about this level—for example, New York State in the early 2000s. And some states may yet do so in the future, judging from Wisconsin's offer to Foxconn and some of the offers to Amazon.

Then the baseline estimates in this study show that in aggregate, these state tax incentives of 1 percent of personal income, if used persistently, would only raise net incomes per capita of state residents by 0.2 percent.[2] Even the middle-income quintile, which is affected the most, would only have its per capita income increased in percentage terms by 3.6 times 0.2 percent, or about 0.8 percent.

But better-designed incentives can do more. For example, if incentives of 1 percent of personal income were consistently targeted at firms with a multiplier of 6, then the incentives would increase state residents' per capita incomes by about 3.0 percent. And the lowest-income quintile would find its income per capita increased in percentage terms by 1.9 times as much, or 5.7 percent.

As another example of better-designed incentives, suppose that instead of tax incentives, a state focused totally on high-quality customized services to locally owned firms. Then the net benefits of these services would increase state residents' per capita income by 5.8 percent. Effects on the lowest-income quintile would be 1.6 times as great in percentage terms, an increase in per capita income of 9.5 percent.

Conversely, poorly financed and designed incentives can damage state economies. Suppose that a state had tax incentives of 1 percent of personal income but financed the incentives by reducing productive K–12 spending. Then persistent use of such incentives would lower state per capita income by 4.4 percent. The loss for the lowest-income quintile would be 4.6 times greater: a loss of 20.4 percent in per capita income.

Realistically, incentives are modest relative to state economies, and they have a mixture of benefits and costs. To have a large net effect, for good or ill, requires that incentive targeting and design be especially good or bad.

1. This statement is based on Bartik (2017). State and local incentives currently add up to around $45 billion, which is 0.3 percent of U.S. personal income.
2. These aggregate effects' estimates assume that the report's estimated effects can be scaled up, with no diseconomies of scale, to 3.4 times the incentive usage of the average state. See Appendix D of full report for discussion of scaling issue, and alternative assumptions.

More importantly, over time the wage losses due to cuts in education spending become larger. The full wage losses occur only after a generation, when the former schoolchildren who suffered from those education cutbacks are in their prime earnings years.

As a result, incentives have benefits for local economic development in the short-run, but costs in the long-run. Incentives' net effects on local incomes are consistently negative after Year 22 since the incentives were awarded.

Targeting high-multiplier firms can increase net benefits of incentives by more than tenfold.

Table 4 Alternative Incentive Policies

Policy regime	Net overall benefits as % of incentive costs	Relative effect on lowest-income quintile
Baseline	22.3	−2.7
50% of incented firms are non-export-base	−77.0	−3.7
Higher multiplier of 6	297.7	1.9
Incented firms pay 10% wage premium	89.3	−0.0
Local unemployment is 10%	56.7	0.5
Increase jobs going to local residents by about one-fourth	62.5	0.7
Front-load all incentives in first year	89.2	1.0
Incentives 100% financed by education spending cuts	−443.0	−4.6
Incentives 100% financed by business tax increases	98.6	2.4
Customized services of high effectiveness to locally owned firms	582.4	1.6

NOTE: Derived from the following table numbers in Bartik (2018): 6, 8, 9, 10, 12, 14, 15, 18, 19, 22. Net overall benefits for all households is present value of income effects over 80 years, as a percentage of the present value of incentives' financial costs. Relative effect on lowest-income quintile is absolute effect on lowest- income quintile divided by overall effect on all quintiles, but calculated as percentage and then divided by 5.08 percent baseline income share of lowest-income quintile. The sign of this relative effect is then set to be positive if the lowest-income quintile benefits, negative if this quintile loses. The reader can quickly see if the lowest-income quintile gains, and whether it gets a greater-than-baseline share of its gains (relative effect greater than 1.00).

ALTERNATIVE INCENTIVE POLICIES

This section considers alternative incentive policies. For each alternative policy, the present value of net income effects for all local residents is calculated as a percentage of the present value of incentive costs (see Table 4). In addition, calculations are presented that show whether the lowest-income quintile gains and, if so, what its share of total gains is. Each alternative incentive policy is a separate scenario that tweaks one or more baseline assumptions.

Baseline Policy

Under the baseline policy, as previously discussed, net benefits of incentives are 22.3 percent of incentive costs. But the lowest-income quintile loses.

Half of Incentives Are Targeted at Non-Export-Base Firms

The baseline policy had all incentives going to 100 percent export-base firms. But policymakers sometimes target non-export-base firms, such as retailers, or firms that are partially non-export base, such as sports teams.

If half of incentives go to non-export-base business activity, incentives have negative net benefits of −77 percent of incentive costs. Under this policy, half of incentives have no benefits from creating local jobs. But these incentives still have both financial costs and costs from education cutbacks. The lowest-income quintile bears a significantly above-average share of these costs.

Target Firms with Higher Multiplier of 6

The baseline policy targeted firms with an average multiplier of 2.5. But some research (Moretti 2010) suggests high-tech manufacturing may have multipliers as high as 6.

If we target multiplier-6 firms, net incentive benefits increase more than tenfold, to almost three times incentive costs. The lowest-income quintile's share of the gains

Front-loading incentives has more effects on firms' location decisions per dollar of incentive costs, because firms heavily discount the future.

is almost twice its baseline income share. These progressive effects occur because the greater multiplier leads to greater job creation, which disproportionately benefits the bottom three income quintiles.

Target Firms That Pay a Wage Premium of 10 Percent

The baseline policy assumed targeted firms did not pay wages that were high or low relative to the credentials required. (The firms may pay high wages, but with stringent education requirements.) What if instead we targeted firms that paid workers 10 percent more than expected, based on the credentials of the workers hired?

Targeting high-wage-premium firms increases net benefits to 89 percent of incentive costs. However, the lowest-income quintile still loses. The higher wages tend to go to higher-income quintiles that have higher employment rates.

Target Incentives at Local Areas with Unemployment of 10 Percent, or Only Use Incentives When Unemployment is 10 Percent

The baseline policy was implemented in a local economy with an initial unemployment rate of 6.2 percent, which is the average local rate over the past quarter century. What if instead we assumed the initial unemployment rate was much higher, at 10 percent? Based on research (Bartik 2015), higher local unemployment will cause a higher proportion of local job growth to go to the local nonemployed.

Incentive policy could target high unemployment in two ways. First, states could target incentives at high-unemployment local areas. Second, states could vary incentives with overall state unemployment.

Targeting incentives at high-unemployment places or times more than doubles net benefits, from 22 percent in the baseline to 57 percent in the high-unemployment scenario. Net benefits for the lowest-income quintile become positive, as more jobs go to the local nonemployed. However, the lowest-income quintile still gets less than its share of benefits, as its share is only about half of its base income share.

Increase Jobs Going to Local Residents by about One-Fourth

Incentive policy could also try to target job creation at the local nonemployed. This could be done by training policies that encourage incented firms and other firms to hire the local nonemployed (Bartik 2001, pp. 255–261).

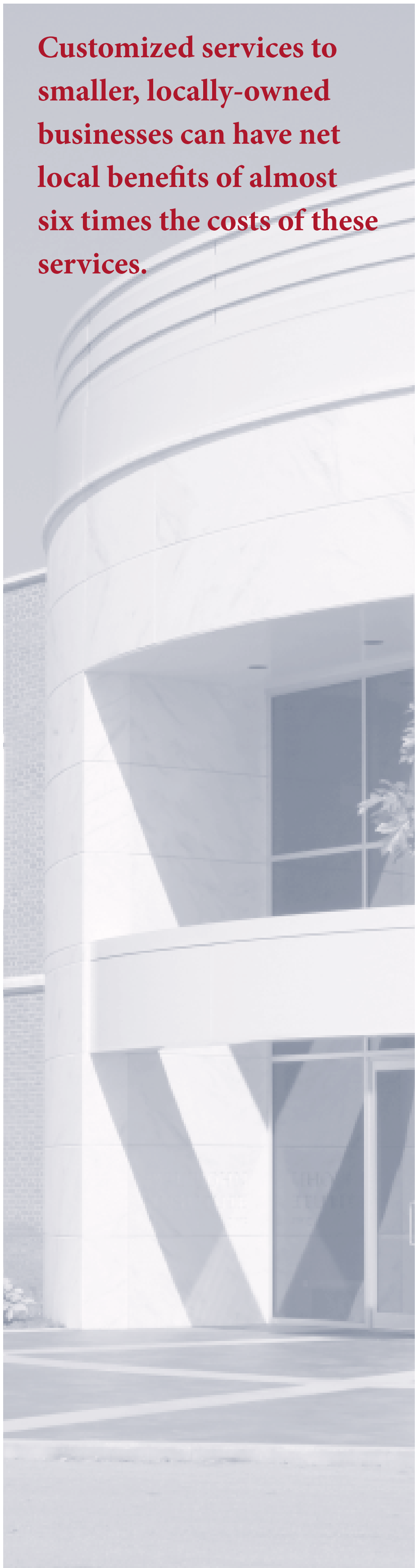
If the share of jobs going to the local nonemployed was increased by about one-fourth, from the baseline 15 percent to 19 percent, this would have a similar impact to targeting incentives at high-unemployment local economies. Net benefits increase to 62 percent of incentive costs. The lowest-income quintile gains, but its share of gains is less than its baseline income share.

Front-Load All Incentives in First Year

The baseline scenario assumed that incentives followed the usual state pattern: incentives are highest in the first year but continue to be large through Year 10. What if instead states did 100 percent front-loading, with all incentives occurring in the first year? This has more effects on firms' location decisions per dollar of incentive costs, because firms heavily discount the future. The job creation credit or property tax abatement in Year 10 does not much affect business location decisions, but it undermines future education spending and wages.

Completely front-loaded benefits increase net benefits to 89 percent of incentive costs. The lowest-income quintile now gains roughly the same share of benefits as its baseline income share. This quintile gains from higher job-creation effects of more front-loaded incentives.

Customized services to smaller, locally-owned businesses can have net local benefits of almost six times the costs of these services.



Front-loaded incentives carry the possibility that incented jobs may leave. This problem can be alleviated by designing incentives to include clawback provisions, under which some incentive costs would be recovered if the jobs do not persist (Weber 2007).

Incentives 100 Percent Financed by Education Spending Cuts

In the baseline, about 11 percent of incentives' financial costs are financed by cutting K–12 school spending. What if instead 100 percent of incentives were financed by K–12 spending cuts?

School-financed incentives result in huge overall losses in local incomes, of over four times incentive costs. These losses are disproportionately large for the lowest-income quintile, whose share of the losses is almost five times its baseline income share. The future wage losses due to education spending cuts are bad for all local residents, but are particularly bad for the lowest-income groups.

Incentives 100 Percent Financed by Business Tax Increases

In the baseline, 22 percent of incentives' financial costs are financed by business tax increases. What if instead 100 percent of incentives were financed by increasing the business tax rate?

This financing significantly increases incentive net benefits, to 99 percent of incentive costs. The lowest-income quintile now gains, and its share of the benefits is over twice its baseline income share.

This result is surprising because higher business-tax rates have some negative effects on private job creation. But these negative job effects are outweighed by the gains to local residents from "exporting" more costs of incentives to out-of-state business owners. This financing also avoids negative effects from education spending cuts.

Providing Incentives as Efficient Customized Services to Smaller, Locally Owned Businesses

What if instead of tax incentives to large out-of-state businesses, we provided customized services to small, locally owned businesses? Research shows that customized business services—such as customized job training and manufacturing extension services—can affect location and expansion decisions about 10 times as much, per dollar, as tax incentives.[5] Research also suggests that locally owned businesses spend more than non-locally-owned businesses on local suppliers. However, locally owned businesses may be less likely to be "export-base" businesses.

In this alternative scenario, customized services are assumed to be provided to locally owned businesses that are not export-base businesses. But job creation in these businesses still generates local jobs, because these businesses and their owners spend more locally. These customized services are assumed to affect the probability of job creation 10 times as much as tax incentives of the same cost. Finally, it is assumed that such business services are modestly income-targeted: business owners in the top 10 percent of the income distribution are limited to receiving no more than 10 percent of such services, and therefore 90 percent of such services go to business owners in the bottom 90 percent of the income distribution.[6]

Such efficient customized services to locally owned, non-export-base firms have large net benefits: almost six times incentive costs. The lowest-income quintile gains, and its

5. See research reviewed in Bartik (2018)—in particular, research by Hollenbeck (2008), Holzer et al. (1993), and Hoyt, Jepsen, and Troske (2008) on customized job training, and Jarmin (1998, 1999) and Ehlen (2001) on manufacturing extension.
6. Such targeting seems both politically plausible and economically sensible. Business owners in the bottom 90 percent are more likely to need business services, and more likely to spend their profits locally than higher-income business owners. See full report (Bartik 2018) for more discussion.

The politics of incentives would be quite different if it were understood by all that incentives are best financed by increasing business taxes, and not by cutting education spending.

share of gains is greater than its baseline income share. The extra job creation helps this income quintile.

CONCLUSION

As this model shows, based on research on how local economies behave, incentive policy should be reformed in three ways:

1. Tax incentives to large corporations should be more targeted. The most important targeting is targeting on high-multiplier firms. But tax incentives should also be targeted on export-base and high-wage firms, on places and time periods of high unemployment, and on hiring the local unemployed. Tax incentives should be more up front, and should not undermine long-term tax bases.
2. Resources should be shifted away from tax incentives to large out-of-state corporations, and toward customized services to locally owned small and medium-sized businesses.
3. Incentives should be financed by increasing business tax rates, not by cutting education and other local skills development.

These incentive reforms would significantly increase incentives' benefit-cost ratio. The reforms would also make incentive benefits more progressive.

Such reforms would transform incentive politics. The politics of incentives would be quite different if it were understood by all that incentives are best financed by increasing business taxes, and not by cutting education spending. Business tax incentives should be seen as a tool for redistributing business tax burdens away from job-creating businesses and toward other businesses, rather than as a way to lower overall business taxes, or lower overall tax revenues and public services.

A political barrier to reform is incentives' benefits in the short term. Governors and mayors are tempted to buy jobs now at the expense of their eventual successors' tax base. Researchers and advocates can improve the political debate by focusing more attention on what creates local economic development in the long term. Local prosperity is ultimately driven by local skills. Any economic development strategy that threatens local skills development is a mistake. Better economic development strategies will encourage local job creation now in a cost-effective way, thereby protecting the resources needed to invest in local residents' skills.

References

Bartik, Timothy J. 2001. *Jobs for the Poor: Can Labor Demand Policies Help?* New York: Russell Sage Foundation.

———. 2015. "How Effects of Local Labor Demand Shocks Vary with the Initial Local Unemployment Rate." *Growth and Change* 46(4): 529–557.

———. 2017. *A New Panel Database on Business Incentives for Economic Development Offered by State and Local Governments in the United States.* Report prepared for the Pew Charitable Trusts. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. http://research.upjohn.org/reports/225/.

———. 2018. *Who Benefits from Economic Development Incentives? How Incentive Effects on Local Incomes and the Income Distribution Vary with Different Assumptions about Incentive Policy and the Local Economy.* Report prepared for the Pew Charitable Trusts. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. http://research.upjohn.org/up_technicalreports/34.

Ehlen, Mark. 2001. "The Economic Impact of Manufacturing Extension Centers." *Economic Development Quarterly* 15(1): 36–44.

Hollenbeck, Kevin. 2008. "Is There a Role for Public Support of Incumbent Worker On-the-Job Training?" Upjohn Institute Working Paper No. 08-138. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. http://dx.doi.org/10.17848/wp08-138.

Holzer, Harry J., Richard N. Block, Marcus Cheatham, and Jack H. Knott. 1993. "Are Training Subsidies for Firms Effective? The Michigan Experience." *Industrial and Labor Relations Review* 46(4): 625–636.

Hoyt, William H., Christopher Jepsen, and Kenneth R. Troske. 2008. "Business Incentives and Employment: What Incentives Work and Where?" Working Paper No. 2009-02. Lexington, KY: University of Kentucky, Institute for Federalism and Intergovernmental Relations.

Jackson, C. Kirabo, Rucker C. Johnson, and Claudia Persico. 2016. "The Effects of School Spending on Educational and Economic Outcomes: Evidence from School Finance Reforms." *Quarterly Journal of Economics* 131(1): 157–218. doi: 10.1093/qje/qjv036

Jarmin, Ronald S. 1998. "Manufacturing Extension and Productivity Dynamics." Discussion Paper No. 98-8. Washington, DC: U.S. Census Bureau.

———. 1999. "Evaluating the Impact of Manufacturing Extension on Productivity Growth." *Journal of Policy Analysis and Management* 18(1): 99–119.

Jensen, Nate. 2017. "Exit Options in Firm-Government Negotiations: An Evaluation of the Texas Chapter 313 Program". Working Paper No. 2017-10, Washington Center for Equitable Growth.

Moretti, Enrico. 2010 "Local Multipliers." *American Economic Review* 100(2): 373–377. doi: 10.1257/aer.100.2.373.

Weber, Rachel. 2007. "Negotiating the Ideal Deal: Which Local Governments Have the Most Bargaining Leverage?" In *Reining In the Competition for Capital,* Ann Markusen, ed. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, pp. 141–160.

LEARN MORE

This executive summary is based on a report by Timothy Bartik, *Who Benefits from Economic Development Incentives? How Incentive Effects on Local Incomes and the Income Distribution Vary with Different Assumptions about Incentive Policy and the Local Economy* (2018). This report and this executive summary were in part supported by Pew Charitable Trusts. The findings and opinions in this executive summary and report are those of the author, and should not be interpreted as necessarily reflecting the views of the Pew Charitable Trusts or the Upjohn Institute.

INTRODUCTION

This report examines tax incentives and other incentives provided to many businesses by state and local governments in the United States. The report's purpose is to quantify how the effects of such incentives vary under different assumptions: how will incentive effects vary with different incentive policies? The incentive effects examined are on incomes of local residents—that is, residents living within the jurisdiction of the government that provides the incentives. Income effects are measured for different types of local income (e.g., labor income versus property income) and for the incomes of different quintiles of the local income distribution. These incentive effects on income are measured with a simulation model, with estimated parameters based on empirical research. [1]

The report, and the simulation model, are aimed at state and local policy makers, and academics and other groups seeking to better inform state and local policy. The report seeks to affect how policy makers and "policy influencers" think about incentive policy. What are incentive policies' largest benefits and costs, and what groups do these benefits and costs affect? How do alternative designs of incentive policies affect their benefit-cost ratio, or affect the payoff of incentives for different groups, such as low-income groups?

State and local business incentives include business tax incentives and other "cash" incentives. Many businesses making business location or expansion decisions are provided with tax breaks, resulting in lower business tax bills than would be available to all businesses. Sometimes such tax credits are refundable; a business may even end up having "negative" taxes and receiving a cash payment from state or local governments. Prominent examples of such business tax incentives include job creation tax credits and property tax abatements. Job creation tax credits provide a firm with a tax credit or cash payment based on the number and wage rate of newly created jobs. Property tax abatements allow a firm building a new facility, or adding to an existing facility, to pay lower additional property taxes than normal.

Incentives in this report are also defined to include providing individual firms with customized services. Firms making a location or expansion decision may be provided with free or below-cost customized job training, under which local community colleges provide training to a firm's workers. Small and medium-sized manufacturers may be provided with manufacturing extension services, under which a publicly subsidized local agency provides or brokers consulting services to increase these manufacturers' competitiveness. Small businesses may be provided with training and advice through small business development centers.

Incentives in U.S. states currently have the following important features (this is based on Bartik 2017a, which provides many more details):

- Incentives are much larger for "export-base" industries than for non-export-base industries. "Export-base" industries are industries that principally sell their goods and services outside the state, thereby bringing new dollars into the state. Manufacturing industries are typically

1 I've constructed similar but less detailed and flexible models in previous work—for example, in Bartik (1991, 2005, 2011, 2016) and in previous work done for Pew, which in turn was based on a project done for the state of Washington (Bartik and Hollenbeck 2012).

export-base, but there are also some service industries that are export-base, such as computer software. Export-base businesses on average might comprise about one-third of all local jobs. It is the conventional wisdom of policymakers and policy analysts that it makes sense to target export-base industries, as incentives to a non-export-base business are argued to merely redistribute sales and jobs among different businesses in the state. In contrast, an expansion of export-base businesses brings new dollars from outside the state into a state economy. With new dollars flowing into the state economy, there will be multiplier effects on the state economy: as the export-base business expands, it will create other local jobs by buying from local suppliers; the new workers at the export-base business and its suppliers will create some other local jobs due to extra worker spending at local retailers.

- For "export-base" businesses, the typical state and local incentive package—that is, the "usual deal" that is offered to businesses making significant location or expansion decisions—has a present value of between 1 and 2 percent of these businesses' value-added (Bartik 2017a).[2] Because a firm's total wage bill tends to be around half of value-added, the average incentive award to such a firm is around 2 to 4 percent of wages. This is likely enough to affect some location decisions. On the other hand, other cost factors, such as wages and labor productivity, will frequently vary across states by more than 2 to 4 percent of wages, so typical incentives will not overwhelm all other location factors. As a result, in many cases incentives will be awarded for location or expansion decisions that would have occurred anyway.

- There is a lot of variation across states in incentives. Some states have typical incentives of two or three times the national average, ranging up to around 4 percent of value-added, or 8 percent of wages. In a few exceptional cases, such as the recent Foxconn deal in Wisconsin, an individual firm making an exceptionally large location decision may be offered incentives as great as 13 percent of value-added, or 26 percent of wages.

- Although incentives are higher for export-base industries, within the export-base sector there is not much variation of incentives across different industries or firms. For example, there seems little sign that states give much greater incentives to firms that pay higher wages.

- Over 90 percent of incentives are tax incentives. Less than 10 percent are customized services to business, such as customized job training.

- For the typical incentive package for a firm locating or expanding in a state, the incentive provided will be greatest in the first year of the firm's new investment. However, large incentives will also be provided through at least the tenth year of the new investment, and sometimes much longer.

- Annual dollars devoted by state and local governments to business incentives are around $45 billion annually. Although this is not the most important expense of state and local governments, this amount of money is roughly equivalent to what states on net collect in corporate income tax revenue. Therefore, incentives are significant in terms of overall state budgets.

2 The value-added of a business is the difference between its sales and the business inputs it buys from other businesses. Value-added is a standard measure of what a business itself produces through its labor force and capital stock. It is the value of what the business's labor and capital add to what it purchases from other businesses.

- Incentives typically only require that particular investments be made or jobs be created. Incentives rarely have requirements attached in terms of who gets those jobs. The assumption is that more jobs will trickle down to provide benefits for local workers and local taxpayers.

- Incentives do not vary much with the state's unemployment rate. Incentives may be adopted in part because a state has economic problems, but once an incentive program is adopted, it tends to persist for many years—for example, even if the state's economy improves.

- Incentives tend to go to large businesses that are owned out-of-state.[3]

- From 1990 to 2015, incentives have on average tripled. The increased size of incentives has led to increased political pressure for subjecting incentives to evaluation or restraint. Some states (e.g., Michigan and New York) have in recent years made some incentive cutbacks.

The rationale for incentives is to produce benefits for local residents. Among plausible benefits are labor market benefits. If the incentives encourage the location or expansion of economic activity that would not have occurred at that location "but for" the incentive, the incentive may increase local employment, and thereby increase the local employment-to-population ratio and local wages, which will raise local residents' labor incomes. Other benefits include higher property values if the incentive boosts local growth and hence raises demand for local real estate. Finally, the incentive may provide local fiscal benefits. If the incentive increases local incomes and property values, it will raise state and local tax revenue, and this revenue increase may exceed the increased spending needs from a rising population.

Accurately measuring incentive benefits and costs is essential to improve incentive evaluation. Improved evaluation has been pushed by many groups, including Pew Charitable Trusts (e.g., Huh et al. [2017]). The present simulation model does not provide a "cookbook" that can be applied to a specific state. Instead, the report considers incentives in a "typical" state. The important part of the report is that it shows how incentive effects vary, based on different assumptions. Variation in incentive effects occurs because of differences in several factors: how firms respond, local multipliers, incentive design, incentive financing, and local labor markets. The model promotes clearer thinking by policymakers and others debating state and local incentive policy: what factors most influence the relative benefits versus costs of incentives?[4]

A key feature of the model is that it seeks to go beyond simply measuring the direct effects of incentives on incented firms, and the consequent multiplier effects on other local jobs. The model also reflects that incentives have costs. The budget costs of incentives must be paid. Paying for incentives has opportunity costs: increasing taxes or reducing public spending may harm local growth. The most surprising result from this report is that these opportunity costs are often large. For example, financing economic development incentives by cutting school budgets is likely counterproductive.

3 See LeRoy et al. (2015) for evidence on the incentive tilt toward large businesses.

4 It would be possible to take this basic model and customize it to a particular state's economy and incentive programs. However, the illustrative model used here, which uses "averages" for a "typical" state and local economy, provides a good guide to the relative importance of different incentive effects and different incentive design features. Clearer general thinking about incentives does not necessarily require state-specific information, as what significantly alters incentives' benefits and costs will be similar in different states.

This report first outlines how the simulation model works, and how it is based on various assumptions and empirical estimates. The report then provides estimates of the benefits and costs for different income groups of incentives under baseline assumptions and estimates. The core of the report is its exploration of how these benefits and costs vary under different assumptions. These many assumption variations will be discussed in this report in the following groups, which identify different types of changes.

1) **Changes in assumptions that alter the immediate job creation effects of a given incentive-induced reduction in firms' costs.** These variations include how sensitive incented firms are to incentive-induced lower costs, and the multiplier effects of job creation in incented firms on total local job creation.

2) **Changes in assumptions about how incentives are designed and financed.** These variations include whether incentives are provided through cash or cost-effective public services, whether incentives are provided up front or more uniformly over time, whether incentive costs are financed through tax increases or budget cuts, and what types of taxes are increased or what types of budget cuts are made.

3) **Changes in assumptions about who gets the created jobs.** These variations focus on whether the created jobs go to local residents who otherwise would not be employed, or to in-migrants. Who gets the jobs may be affected by local labor market policies, and by local unemployment.

As this analysis will reveal, all of these different assumptions, many of which correspond to different policy choices, can cause incentives' net benefits to dramatically change. The details of incentive policies matter. This shows the power of the model, as it can be flexibly used to consider a wide variety of local circumstances and incentive policy choices, as well as various assumptions about how local economies work.[5]

In a final section, the model is used to analyze a specific issue in economic development policy: if incentives are targeted at locally owned businesses, under what conditions will such a targeted program be most likely to have net benefits? Surprisingly, even if a locally-owned business is non-export-base, under some conditions and some policy designs an incentive policy that targets such locally-owned businesses can have large payoffs.

5 The underlying model is flexible enough that users of the model can substitute their own parameter assumptions for the assumptions I use. This is one key distinction from input-output models such as IMPLAN, and regional econometric models such as REMI, which impose their own particular parameter assumptions on users. Due to limitations of space, this current report necessarily also imposes what are regarded as plausible assumptions, but the report also tries to report how model results vary under a wide variety of assumptions.

OUTLINE OF INCENTIVE MODEL

The model simulates, over a period of 80 years, the effects of some incentive policy that is initiated by a state or local government in Year One. This policy is to offer some group of firms in Year One a set of incentives, paid out over time. This series of promised incentive payments is tied to specific location or expansion decisions in Year One by these firms.

For example, some firm might be locating a new plant. To entice the plant, the state will offer a series of annual payments, paid over as many as 20 years. Alternatively, a firm may be considering an expansion. To encourage that expansion, the state may also offer some time series of payments.[6] In both cases, the purpose of such policy is to encourage job creation due to the new plant or the expanded facility, with a consequent array of diverse effects on the local economy.

This Year One policy for these incented firms is assumed to be maintained over time. That is, in subsequent years, as the value of the incented firms' real estate investments in this location depreciate in value and the firm makes investments to maintain its commitments to this real estate investment, the state or local government continues to offer incentives to encourage these investments by these firms. These continued incentives are assumed to be commensurate with the original incentives but adjusted to match real estate depreciation. That is, if depreciation is some x percent of the firm's initial real estate, where x percent will obviously be less than 100 percent, the new package of incentives is scaled back from the original incentives to x percent of the original incentive package. See below and Appendix B for more discussion.

The net result of these assumptions is that if the firm location or expansion decision is induced by the incentives, the firm's induced jobs are assumed to be maintained at their original level over the entire 80 years of the simulation. However, to maintain these jobs, the original incentive package will have to be maintained for more than its original 20-year term, but at a significantly reduced level in years beyond Year 20.

The model estimates the effects of that Year One incentive policy as it unfolds over the following 80 years on local incomes of different types: labor income, capital gains from increased property values, profits of locally owned businesses, fiscal benefits of local taxpayers. "Local" in this context is best thought of as meaning incomes in a particular state, although it could also be a metropolitan area or other local labor market area. Nonlocal income effects are ignored, so the model ignores losses to residents of other states that might otherwise have obtained the new facility's location, and it ignores gains or losses to out-of-state owners of businesses, for example those due to changes in this state's incentives or business taxes.

After the overall local income gains or losses of various types are estimated, the model then allocates these income gains or losses across the local income distribution—more specifically, gains or losses are allocated across the local area's five "income quintiles," which rank households by whether they are low income, low-to-middle income, middle income, upper-middle income, or upper income.[7] The model estimates what incentive policy does to the present value of the net

6 What about retention decisions? In many cases, these retention incentives may be tied to specific marginal investment decisions made by firms, and may be analyzed similarly. See Appendix A for more discussion.

7 Income quintiles are derived by ordering households by income and then dividing this ordering into five groups of equal population size. The model uses income quintiles from CBO (2016). The Congressional Budget Office (CBO)

income gains of various types of income for the five income quintiles, considering all the relevant multiplier effects, and considering opportunity costs stemming from how incentives are designed and financed.

The logic model of how incentives affect incomes of different types for different groups in a state goes as follows: We start with some incentive package, which has estimated effects on the probability of tipping that location decision—either a new plant-location decision or a facility-expansion decision. The estimated effects on the tipping probability will be based in part on how the incentive is designed and delivered. The probability estimates are derived from the research literature consensus on how taxes affect firms' location decisions.

If the incented firm is an export-base firm, which sells its goods and services to customers outside the state, any tipped location decision of that incented firm will induce the creation of other jobs at local suppliers and retailers. The new dollars brought into the state by the out-of-state sales will in part be respent by the incented firm and its workers on local suppliers and retailers. These induced effects on other jobs are commonly referred to as "local multiplier" effects.

If the incented firm is instead a "non-export-base firm"—that is, its goods and services are sold locally—net local effects are quite different. For incentives to a non-export-base firm, even if the incentive tips the location decision, the new jobs in the incented firm will displace sales and thereby jobs from other local firms. This displacement of other local firms' sales and jobs has the potential to totally offset the job creation of the incented non-export-base firm. However, if the incented firm is locally owned, the incented firm may tend to spend more on local suppliers than is true for competing non–locally owned firms. In addition, the incentives and the resulting expansion of local firms would increase profits of locally owned firms, and local owners would spend some of their extra income on local goods and services. Therefore, for non-export-base firms that are locally owned, incentives may still result in some net job creation effects.

To sum up these direct effects on induced jobs and multiplier jobs: These direct effects of the incentive policy would be expected to increase local job growth, but only by a small fraction of the originally incented jobs, because most incentives only tip location and expansion decisions for a small percentage of incented firms. Most incented firms would have located or expanded at this location even if the incentive had not been provided.

But the incentive must be financed by either raising taxes or cutting public spending. Both financing mechanisms have negative demand effects on local jobs, because either will reduce local incomes, leading to less local purchasing power and thereby less local retail sales and fewer jobs. Financing of incentive costs also has some negative "supply side" effects, by raising business costs and reducing worker skills. Raising business taxes is likely to reduce the growth of other local businesses. Cutting education spending is likely to depress local workers' future wages, but this effect is much delayed.

Because of the incentives and their financing, there is some net effect on local jobs due to the combination of the incented jobs, the multiplier jobs, and the negative effects of the incentive financ-

adjusts household income before the income ordering by dividing each household's income by the square root of household size, which roughly adjusts for how a household's needs vary with its size. The resulting household income quintiles range from Quintile 1, which has the lowest income, to Quintile 5, which has the highest income.

ing. This net local job growth in turn affects local employment rates (the ratio of local employment to local population), wage rates, housing costs, and the local population. Some of the new jobs go to local residents who otherwise would not be employed, increasing local employment-to-population ratios, while other jobs go to in-migrants.[8] Higher employment and population puts upward pressure on housing prices and other local real estate prices. The higher local labor demand relative to labor supply also puts some upward pressure on real wage rates. Wages also may be affected if induced jobs pay wage premia relative to similar jobs for workers with given characteristics. These increases in wage rates and housing costs raise local business costs, which will tend to reduce job growth in some local businesses, so net job effects end up also reflecting these feedback effects.

After all these feedback effects are incorporated, the resulting increase in employment and the accompanying increase in local incomes will increase state and local tax revenues, and the resulting increase in population will increase the need for state and local public spending. Fiscal benefits tend to be positive because of three factors: 1) tax revenues go up with employment and incomes, 2) spending needs increase with population, and 3) increases in local labor demand increase employment-to-population ratios. The resulting net fiscal benefit reduces the need to finance incentive costs. These feedback effects are also incorporated into the model.

In the end, all these effects alter five types of income:

1) Fiscal benefits or costs, which accrue either to taxpayers or local residents in the form of higher taxes or lower public spending.

2) Net labor income effects of increased labor demand on employment-to-population ratios and wage rates, adjusted to be net of tax increases.

3) Net property value gains for local property owners, adjusted to be net of property tax increases.

4) Net effects of higher costs and higher business taxes on after-tax business profits of businesses owned by local residents. These net effects may possibly be offset by receiving some incentives.

5) Reduced future wages due to cutbacks in education spending. These reduced future wages are adjusted to be net of the lower tax liabilities due to lower wages.[9]

Finally, these net effects on local incomes of different types are divided among quintiles in the local income distribution. This division among quintiles is based on how labor demand shocks,

---

8 What about new local jobs that go to the local employed? As explained further below, this creates a local job vacancy, which will be filled either by the local employed, the local nonemployed, or in-migrants. (The local nonemployed consists of two groups: the local unemployed; local residents who are not in the labor force.) This job vacancy chain ultimately terminates in new jobs for either the local nonemployed or in-migrants. To put it another way, a shock to local employment must result in some combination of an increase in the local employment-to-population ratio and local population. See below and Persky, Felsenstein, and Carlson (2004).

9 The effects of both increased labor demand and education cutbacks are effects on labor market income, so they both are effects on the same "type" of income. However, I choose to describe these two effects separately, largely because the effects of education cutbacks are much delayed compared to the effects of increased labor demand, and also because they are distributed across income quintiles quite differently.

labor incomes, property ownership, business ownership, and tax shares and spending shares are distributed by income quintile.

Because the model is simulated over 80 years, the model necessarily incorporates some parameters governing model dynamics—that is, how model effects change over time. Model dynamic parameters are derived where possible from the empirical literature.

One question that might be asked is: why consider incentive policy effects over such a lengthy period, of 80 years? As will be seen, the answer is: because many of the most important effects of incentives only occur in the long-term. In particular, the wage losses due to cutbacks in education spending only fully occur after 20 years or more, when former K-12 students enter the local labor market and then begin their peak earnings years. A shorter time horizon overlooks these important effects.

MODEL ASSUMPTIONS IN THE BASELINE SCENARIO

This section summarizes the key assumptions of the model. More details are in the report's Appendix C. Alternatives to the baseline scenario assumptions are considered later in the report, when the report explores how incentive effects vary under different assumptions about factors such as incentive multipliers, incentive design and financing, and local labor markets.

In the model and the report, all figures are in 2015 dollars, unless otherwise stated. Unless otherwise stated, all "jobs" are measured as full-time-equivalent jobs.

In the model, real wages per full-time-equivalent worker, and other similar measures of the size of real economic variables per full-time-equivalent worker, are assumed to grow each year from Year One to Year 80 by 1.2 percent. This real economic growth assumption is based on the long-run projections of the Social Security Board of Trustees. Based on this assumption, the model simulations assume that a wide variety of different variables have a baseline growth rate, when taken as a ratio to full-time-equivalent workers, of 1.2 percent annually, including the following: real wages, real value-added, real property values, real personal income, real general state and local revenues, real state and local general expenditures, real costs of creating or destroying jobs through demand or supply shocks to local taxes and spending, and real costs of creating or destroying jobs through cost shocks to local wages and other local costs.

In evaluating model benefits and costs from a social perspective, the model consistently uses a 3 percent real discount rate. A 3 percent real discount rate is commonly used in benefit-cost analyses.[10] This commonly-used discount rate for benefits and costs, from society's perspective, implicitly assumes that although future benefits or costs from Year 20 on should be discounted somewhat, such future benefits or costs, if persistent enough, may often be large enough to significantly affect a policy's net benefits.[11]

Incentive Effectiveness Rate

The incentive effectiveness rate is derived from assumptions about how firms respond when the costs of a new plant location or facility expansion are lowered by incentives. "Costs" are here operationalized as the "value-added" associated with the new plant, or with the facility expansion.

In economics jargon, "value-added" is the difference between sales and the firm's purchase of goods and services other than capital and labor. For example, "value-added" for a steel company is the value of steel sold, subtracting out the cost of inputs such as iron and coal and electricity. It is the "value added" to these inputs by the firm's capital and labor. The big advantage of "value-

10 See the discussion of discount rates in Bartik (2011). The Moore et al. (2004) article, under the 1.2 percent real wage growth assumptions used here, implies a long-run discount rate of 2.2 percent. The EPA uses discount rates of both 3 percent and 7 percent.

11 At a 3% real discount rate, a future $1 in various years has the following value in today's dollars: Year 20, 57 cents; Year 40, 32 cents; Year 60, 17 cents; Year 80, 10 cents. What this means is that long-run persistent costs or benefits, even at Year 60 or Year 80, can be important. For example, as around Year 60, 6 years of gaining or losing $x is equivalent to $x today.

added" is that it is a measure of the costs of production that is unaffected by rearrangement of corporate ownership—for example, if a firm buys its suppliers. Total sales go down when a steel company buys the company that supplies its iron, but total value added in the economy will not change.

The baseline model assumes that an incentive whose present value, from the firm's perspective, is 1 percent of value-added will increase location and expansion decisions by 10 percent.[12] In other words, an incentive package of 1 percent of the value-added associated with the new plant or the facility expansion will tip 10 percent of location and expansion decisions.[13] Ten percent of the incented firms would not have located or expanded in this local economy "but for" the incentive package, whereas the other 90 percent of the incented firms would have made the same location or expansion decision without the incentive package.[14]

This cost sensitivity of location decisions to incentives is based on the consensus in the research literature about the sensitivity of state and local business-location decisions to business taxes. The location cost sensitivity that is used is the response of location decisions to state and local business taxes, holding public services constant.[15] The public-service-constant response to business taxes and costs is the appropriate response to use because the model later explicitly allows for changes in public spending and services to have both demand-side and supply-side effects.

This cost-sensitivity may appear small to some readers. In particular, state and local policy makers concerned with economic development often implicitly or explicitly assume that 100 percent of incented business activity, or close to 100 percent, would not have been attracted to this local area "but for" the incentives. But this common assumption is not justified by business location research.[16] Nor does this common assumption make sense given that many other cost factors vary across local areas far more than is provided by typical incentives.

12 As explained further below, and in Appendix D, this is a slight oversimplification. Because the responsiveness is derived from equations in which the logarithm of jobs is related to the logarithm of costs, the actual effect on the location probability of a 1 percent incentive will be slightly less than 10 percent: 9.56%.

13 The simulation model implicitly assumes that this incentive effectiveness "but for" percentage does not systematically vary with local characteristics or the national context. This assumption is because there is no good empirical or theoretical evidence of such variation. Appendix D discusses this issue.

14 An alternative interpretation is that 10 percent of the incented activity is new relative to what would have occurred without the incentive, including the incented firm possibly locating there anyway, or other firms choosing the same site without the incentive.

15 Without holding public services constant, the research consensus is that the long-run elasticity of state and local business activity to total state and local business taxes is −0.2 (Bartik 1991; Wasylenko 1997). However, Phillips and Goss (1995), in a meta-analysis of the literature, show that holding public services constant makes the business tax elasticity more negative by −0.3, which implies an overall elasticity, holding public services constant, of −0.5. In addition, Bartik (1992) concludes that for studies that use both area fixed effects and control for public services, the average elasticity is −0.50, with a 95 percent confidence interval from −0.15 to −0.85. Business taxes average 5 percent of value-added (Bartik 2017a; Phillips, Sallee, and Peak 2016). Therefore, if cost changes induced by tax changes or incentive changes have similar effects, the business tax elasticity implies that cost changes as a percentage of value-added of 1 percent have a −10 percent effect (−10 = −0.5/5 percent). The long-run elasticity consensus from the research literature is derived from a literature review by Bartik (1991) that treats effects on new facility location or expansion decisions as long-run effects. The literature reviews by both Wasylenko (1997) and Phillips and Goss (1995) do not find much evidence that the long-run elasticities from such micro studies differ greatly from the implied long-run elasticities of aggregate business activity. See Appendix D for more discussion.

16 In addition to the general literature on how business location decisions respond to taxes, some recent research also supports that only a minority of incented location decisions would not have occurred "but for" the incentives. For example, Jensen's (2017) study of the Texas Chapter 313 program suggests that at most 15 percent of incented firms would have chosen another state without the incentive.

Consider that an incentive of 1 percent of value-added will be roughly 2 percent of wages. This incentive probability means that lowering costs by 2 percent of wages alters location decisions enough to boost employment by 10 percent. This is not a trivial size for an effect. This effect seems reasonable given that wages, labor productivity, and other costs vary across locations in the United States by far more than 2 percent of wages. Given the large variation in costs across location due to many other location factors, it should not be surprising that only a minority of firms are on the margin where a modest cost change, of 2 percent of wages, ends up altering the location decision.

In addition, this sensitivity implies that for observed levels of state incentives, estimated effects on the probability of tipping location or expansion decisions can in some cases be sizable. For example, as of 2015, the state with the largest incentives was New Mexico, which had incentives of around three times the national average. With the assumed sensitivity, location incentives of New Mexico–size would be expected to tip 31 percent of location decisions. As a more extreme example, consider the incentive package recently agreed to by Wisconsin with Foxconn. This incentive package is at least 10 times the current national average incentive package. With the assumed sensitivity, the estimated probability of a Foxconn-size incentive package tipping a location or expansion decision is 76 percent. [17]

The present value of incentives that is relevant to a firm's location decisions depends on how the firm discounts future dollar flows. The real discount rate used by firms in making location and expansion decisions is assumed to be a 12 percent real rate. This 12 percent firm discount rate is based on research by Poterba and Summers (1995) and is derived from surveys of corporate CEOs asking what discount rates they use in evaluating investment projects.

The Time Pattern of Assumed Incentive Offers

The initial 20-year period, from Year One, when the initial location or expansion decision occurs, to Year 20, is assumed in the baseline scenario to have a level and time pattern of incentives that matches the national average reported in Bartik (2017a). Table 1, column B, reports the time pattern of incentives as a percentage of value-added for these 20 years—and also, as can be seen, for following years.

After 20 years, what happens? Few state or local policymakers explicitly promise or ensure incentive packages that last more than 20 years. But both economics and politics suggest that the incentive offer will at some point be repeated, at least in part. From an economics perspective, a firm's capital investment in a location depreciates. If the initial location or expansion decision was suc-

17 These estimated probabilities come from entering into the model the New Mexico and Foxconn incentive percentages as a percentage of value-added for each of the first 20 years of a new plant. Then, as described below, similar incentive packages are assumed to continue to offset depreciation into the future. The New Mexico incentive package has an overall present value, as a percentage of the present value of value-added, of 3.68 percent. A Foxconn-style incentive package's present value, as a percentage of the present value of value-added, is 13.29 percent. For comparison, as discussed below, the average incentive package has a present value, as a percentage of value-added, of 1.24 percent. All these calculations use a 12 percent real discount rate. Appendix D provides more specifics of how these incentive percentages are translated into tipping probabilities. As that appendix points out, the model shows some diminishing returns as incentive percentages increase, and is not simply derived by multiplying by 10 times the incentive percentage. These diminishing returns are certainly plausible at some point as incentives increase (tipping probabilities cannot exceed 100 percent), but there is no clear empirical evidence on when diminishing returns start.

cessfully induced, this implies that if the incentive had been unavailable, the location or expansion decision would have occurred elsewhere, or not at all. Therefore, if no future incentives are provided, the incented firms will tend to adjust to the economic reality that this location decision was not these firms' best location decision, but for the incentives. The incented firms' jobs and capital stock will readjust toward zero.

In other words, it is implausible to expect a one-time, temporary, and never-repeated incentive offer to lead to a permanent increase in an area's economic activity. Assuming such permanent effects of temporary reversed shocks will bias economic analyses of incentives toward overestimating benefits relative to costs. [18]

The state and local policymakers for this location know that without future incentives, the incented jobs may leave or be downsized. To avoid this, the state, in concert with the local area, may choose to offer future incentives. From an economic perspective, if the original incentives were believed to pass a benefit-cost test, perhaps the same belief will hold for a new round of incentives. From a political perspective, if a state or local area has offered incentives to attract some firms, political pressure will exist for these jobs and investments to be maintained.

Therefore, I assume that the initial jobs will be maintained, but that some future incentives will be provided after Year 20. What future incentives seem reasonable? In the real world, the incentives that would be provided, and the time at which they would be provided, would vary greatly across individual firms. But what I want to capture is some time path of future incentives that seems reasonable, averaged across all firms incented in Year One.

I treat the incented firms' investment in this location as an investment in business real estate.[19] Each year from Year 21 onward, there on average will be some depreciation of these incented

18 One could make the argument that a one-time shock to private capital stock might be able to maintain itself in the future through agglomeration economy effects, which would somehow cause the short-term equilibrium of the capital stock to affect its long-run equilibrium level in the local economy. But if an analyst is willing to assume that a temporary cost reduction that shocks private investment permanently increases the area's business capital stock, perhaps similar hypotheses should be entertained for "human capital" (Human capital is economics jargon for the stock of skills that human beings possess that have some value in producing well-being, for example through being more productive in the labor market and garnering higher earnings.) For example, in the below analysis, a one-time shock to human capital due to lower education spending is assumed to have effects on human capital only as long as the education spending shock is maintained. If physical capital stock shows some hysteresis effects in its long-run equilibrium, the same might be true of human capital. For example, perhaps parents powerfully pass on their own human capital to their children, sufficiently for a one-time temporary shock to the human capital level of one generation to permanently alter the area's level of human capital. However, in general it seems more prudent to exclude such permanent hysteresis effects without clear empirical evidence. Allowing for such permanent effects blows up future benefits in the simulation model, potentially dominating the model with future benefits that have a weak empirical foundation.

19 An alternative would be to consider the depreciation in the business's overall capital. For example, if we also include export-base businesses' machinery and equipment, along with business real estate, in the relevant capital stock, the average annual depreciation rate from BEA data for export-base businesses is 6.57 percent. (If we added inventories to the capital stock and assumed inventories depreciate in value by a very high annual percentage, the average annual capital depreciation rate would further increase.) This higher deprecation would imply the need for much higher future incentives to offset future depreciation. The assumption in the model is that we are looking at location decisions, and that incentives will only need to offset real estate depreciation to retain capital that is already at that location. Business machinery and equipment investment (and inventory investment) is mobile, and its location is tied to where the business chooses to locate its real estate investments.

firms' real estate investments in this local economy. Using the data from Bartik (2017a), derived from BEA data, the average annual depreciation of the real-estate capital of export-base firms is 2.59 percent.[20] Therefore, I assume that on average across all incented firms, in each year from Year 21 on, a new 20-year package of incentives is provided that is 2.59 percent of the original package.

As a result, in Year 21, it is assumed that the incented firms, across all their jobs, receive incentives not at the original level of 3.54 percent of value-added in Year One, but at 3.54 percent times 2.59 percent, or 0.09 percent of value-added. These incentives, along with similarly scaled-down promises of future incentives for the 19 years after Year 21, are offered to encourage the incented firms to maintain their local investment in business real estate.

In Year 22, there is an additional 2.59 percent of depreciation. Therefore, an additional package of incentives is initiated, at 0.09 percent (= 3.54 percent times 2.59 percent). In addition, the incentive package to offset the depreciation of Year 21 will pay out incentives of 2.59 percent times 1.69 percent (the original Year Two incentive level), or 0.05 percent of total value-added. The total incentive payments will be 0.14 percent—0.09 percent paid to offset the Year 22 depreciation plus 0.05 percent paid to offset the Year 21 depreciation.

These assumed payments to offset the depreciation of business real estate investments continue to increase from Year 21 to Year 40, until they max out at average annual payments of 0.49 percent of value-added. Table 1, column B, reports the percentage of value-added assumed to be paid in incentives, from Year 21 through Year 40 (after which the payments stay the same), as a percentage of value-added of incented firms.

Are these assumptions reasonable? Without complete data on what incentives tend to be provided and then renewed for a wide cross section of firms, it is hard to be sure. It should be recalled that the incented payments posited here are not meant to depict what happens for some specific firm, but rather what happens on average across a large group of firms. Some type of future incentive payments that grow over time, but are significantly less than the original incentives, would seem to be a reasonable assumption. That is what Table 1 shows.

To put it another way, these future incentive assumptions could be seen as being equivalent to implying that from Year 21 on, each year, on average, about 1 out of every 39 of the incented firms (1/39th is approximately equal to 2.59 percent) will receive a new incentive package similar to what was received originally. Or alternatively, that each year, 1 out of every 19 or 20 incented firms will receive new incentive packages equal to half of the original incentive package. Such assumptions about future incentive payments seem plausible.

What happens if these future incentives are not provided in this pattern? Then presumably both the future costs and the future benefits of incentives go down. Although future incentive payments are avoided, presumably there will be some depreciation of the originally induced jobs. How will this alter the comparison of incentive benefits and costs? An intuitively plausible proposition is that if these future incentives have a similar benefit-cost ratio to the original incentives, these cutbacks

20 This 2.59 percent multiplies the 2.71 percent average depreciation of the structures portion of real estate for export-base firms, times the 95.4 percent of these export-base firms' real estate that is in structures. The remaining portion is in land, which does not depreciate.

Table 1 Baseline Pattern of Incentive Costs

Column A Year of new facility operation	Column B Incentive as % of value-added	Column C Value of incentive (in millions of dollars) for export-base firms with 10,000 total jobs
1	3.54	62.8
2	1.69	30.3
3	1.64	29.7
4	1.58	29.0
5	1.50	27.9
6	1.35	25.4
7	1.29	24.5
8	1.21	23.2
9	1.17	22.7
10	1.14	22.5
11	0.40	8.0
12	0.39	7.9
13	0.30	6.2
14	0.30	6.2
15	0.30	6.2
16	0.25	5.4
17	0.25	5.4
18	0.25	5.5
19	0.25	5.5
20	0.25	5.5
21	0.09	2.1
22	0.14	3.1
23	0.18	4.1
24	0.22	5.1
25	0.26	6.1
26	0.29	7.0
27	0.33	7.9
28	0.36	8.7
29	0.39	9.6
30	0.42	10.4
31	0.43	10.8
32	0.44	11.2
33	0.45	11.6
34	0.45	11.9
35	0.46	12.2
36	0.47	12.6
37	0.47	12.9
38	0.48	13.2
39	0.49	13.6
40	0.49	13.9
Year 41 and following	0.49	Annual growth at 1.2% to match value-added growth

NOTE: This time pattern of incentive provision represents average incentive values and time path from Bartik (2017a), combined with the assumption, as outlined in the text, that starting in Year 21, on average a scaled-back incentive package needs to be provided to offset annual depreciation of business real estate of 2.59%. The 10,000 jobs in export-base firms that are incented are assumed to have average value-added per job of export-base firms. Value-added per job in real terms is assumed to grow 1.2% in real terms over time, from Year 2015 base in Year 1. All dollar figures are in 2015 dollars. Present value of this 20-year incentive stream, as a percentage of present value of value-added over an infinite time horizon, discounted at 12% real discount rate, is 1.24%.
Present value of incentives is $508.5 million, when incentives from Year 1 to Year 80 are discounted back to 2015 dollars at a 3% real social discount rate. Social discounting is only done through Year 80 to be consistent with discounting of all other variables.

in both benefits and costs will have no effect on the overall benefit-cost ratio for incentive policy. I demonstrate this proposition more formally in Appendix B. I also show empirically that this occurs, by simulating the model with incentives for just 20 years, but with depreciation of induced jobs at a 2.59 annual percent rate after that year.

Appendix B also considers some alternatives to these depreciation assumptions. Assuming lower depreciation tends to increase net benefits for incentives, as then incented jobs can be maintained at lower future costs. However, although different depreciation assumptions change the overall level of incentive net benefits in the baseline scenario, different depreciation assumptions do not dramatically alter the qualitative pattern of how incentive benefits differ across different policy scenarios.[21] Therefore, even with altered depreciation assumptions, the implications of this report for what policies will increase incentives' net benefits still go through

Incentive Program Size, Incentive Payments, and Incentive Effects on Incented Firms

The model assumes 10,000 incented jobs.[22] These incented jobs are assumed to initially have value-added per worker and wages per worker equal to those of the average export-base industry, based on 2015 figures from BEA. The export-base industries included are the 31 export-base industries used in Bartik (2017a). These 31 industries include all 19 manufacturing industries, and 12 nonmanufacturing industries including software, computer systems design, warehousing, and scientific services.

As described above, the incentive payments as a percentage of value-added are assumed, from Year One to Year 20, to follow the pattern found in 2015 for the average state, from Bartik (2017a). After Year 20, the incentive payments are assumed to be smaller, and to be proportional to average depreciation of business real estate.

The actual incentive payment is equal to the incentive percentage times the value-added associated with these 10,000 jobs. As value-added per full-time equivalent jobs grows at 1.2 percent annually, the change in the actual annual incentive payment in each year depends upon both the assumed percentage and the growth of value-added.

Table 2 shows the actual incentive payments per year assumed in the model. At a 3 percent real discount rate, the present value of this incentive package is $508.5 million.[23] The first 20 years of the incentive package comprise $308.8 million of this incentive package. Therefore, the assumed future incentive payments, to offset some future depreciation of these firms' real estate investments, add about 64.7 percent to the incentive package's costs (1.647 = $508.5/$308.8).

Although such incentive payments may seem implausibly large, they are not out of line with what is observed in the United States. For example, Wisconsin recently offered Foxconn more than $4.5

---

21 This is less true for scenarios that alter financing of incentives.

22 The model as constructed would simply scale all benefits and costs up or down with the number of incented jobs—that is, benefits and costs would be twice as great if there were 20,000 incented jobs. This is because the incentives are assumed to be "small enough" relative to the overall state or local economy that we can ignore feedback effects due to effects on the overall unemployment rate significantly affecting the model dynamics.

23 This is the present value over an 80-year period. The 80-year cutoff is chosen to be compatible with all the calculations of social benefits and costs in the model.

billion over a 15-year period, for a new facility that may have 13,000 jobs. This initial Wisconsin package does not include any possible future incentives for Foxconn, which plausibly will occur if this facility ends up staying in Wisconsin over the long term. Given this context, providing 10,000 jobs with incentives worth $308.8 million over the first 20 years, and $508.5 million over 80 years, is moderate.

The firms' location decisions are assumed to be driven by the present value of all incentive payments, as a percentage of the present value of value-added, over an infinite time horizon. All incentive payments matter to location decisions, including the assumed future incentive payments after Year 20. Therefore, the future incentive payments not only add budget costs, but also add some benefits by affecting location decision.

As mentioned above, firm location decisions are assumed to be based on evaluating their costs and profits using a 12 percent real discount rate. [24] The present value of the incentive package, as a percentage of the present value of value-added, ends up being 1.24 percent. [25]

Based on the assumed cost sensitivity of firms' location decisions to lower costs, incentives that lower costs by 1.24 percent will affect location decisions by about 10 times as much, or 12 percent. Because the model assumes a log-linear response of jobs to costs, the actual change in the probability of a location decision is slightly less than 10 times the incentive percentage of 1.24 percent, at 11.70 percent. [26]

How should this "tipping probability" be interpreted? For any particular firm, the actual "tipping probability" from the perspective of the firm is either zero percent or 100 percent. In other words,

---

24 Because of the higher firm discount rate, the present value of incentives over an infinite time horizon, or for that matter over 80 years, is only 3.5 percent higher than present value of incentives cumulated through Year 20. Therefore, from a social perspective, offering future incentives raises the present value of total costs by a greater percentage than it affects Year One location decisions. However, offering future incentives also offers future benefits by avoiding the depreciation that is assumed to otherwise occur. Thus, if future depreciation is assumed to be likely, adding in future incentives plausibly does not affect the overall incentive benefit-cost ratio.

25 This 1.24 percent figure is consistent with the 1.42 percent average figure reported in Bartik (2017a). The current calculation uses an infinite time horizon, with value-added per worker increasing by 1.2 percent per year, and future incentives being provided after Year 20 to offset depreciation of 2.59 percent annually. The latter used only a 20-year time horizon and held value-added and jobs constant over those 20 years.

26 Although 1.24 percent is an "average" scale of incentives, what about the effects of incentives at a significantly higher or lower scale? As explained in Appendix D, the simulation model, which assumes a constant elasticity of business location decisions with respect to business costs, ends up implying some modest diseconomies of incentive scale over a plausible range from 1.24 percent to perhaps three times as great an incentive rate. This encompasses the range of the typical "usual deals" offered by states in the United States. These slight diseconomies mean that benefit-cost ratios would be slightly lower for incentives that are two to three times the baseline incentive rate of 1.24 percent focused on in the main text of the paper. On the other hand, diseconomies are more significant when we get to the Foxconn deals, which are of a magnitude perhaps 10 times greater than the average U.S. deal.

Why isn't this diseconomy of scale issue emphasized more in the main report's text? I choose not to do so because this slight diseconomy really stems from assumptions that may be reasonable but are not supported by direct empirical evidence. It is possible that there are modest economies of scale in incentive provision, or modest diseconomies, but our estimates of how business location and expansion decisions respond to taxes and other cost changes are not definitive and precise enough to tell us which is more likely. However, in some extreme cases, there are quite likely to be diseconomies of scale, because the probability of tipping a location decision cannot exceed 100 percent no matter how large the incentive.

either the firm would have made the same location and expansion decision without the incentive, or it would not have made this location or expansion decision "but for" the incentive. But the state and local policymaker does not know the true tipping probability, unless it has on its staff mind-reading telepaths who can tell policymakers what the firm is thinking about its decision. In the absence of such magical inside information, the "tipping probability" used in this report represents this probability from the perspective of state and local policymakers, based on their best estimate. This best estimate of the tipping probability is based on the empirical research literature on how firms respond to costs such as changes in taxes, and the assumption that firms will respond similarly to incentives, such as "negative taxes," as they do to taxes.

Given the nature of the research literature on how taxes affect location decisions, the tipping probability represents total activity with the incentive compared to activity at that same location without the incentive. Therefore, the tipping probability of 11.70 percent is saying that without the incentive, 88.30 percent of the time the firm would have made the same location or expansion decision, or some similar firm would have chosen the same site. Therefore, a tipping probability of 11.70 percent might be compatible with a particular firm being tipped by a somewhat greater probability than 11.70 percent on average.

In other words, even if in a given case an incentive was decisive in causing this firm to choose this site, this does not mean that without the incentive, this site would have experienced zero business activity. Some other firm might have chosen that same site, and some jobs might have been created anyway.

Thus, the tipping probability is meant to state what percentage of incented jobs would not have been created at this site "but for" the incentive. The counterfactual without the incentive includes possible jobs created by this firm anyway, by making the same location or expansion decision, or by other firms. From a benefit-cost perspective, the tipping probability represents the direct job effects of the incentives, which will drive a large part of the subsequent benefit-cost analysis.

Multiplier Effects

The new jobs induced in incented firms, due to activity that would not have occurred "but for" the incentives, will have local multiplier effects, at least if they are export-base firms. Incented firms that are export-base firms will bring new dollars into the local economy from sales to customers outside the state. These new dollars will in part be respent on local suppliers. Expanded sales by local suppliers will cause these suppliers to add jobs. The added jobs at induced incented firms, and at these expanding local suppliers, will lead to more workers with higher incomes. These workers will spend some of their increased local income at local retailers. This will cause these local retailers to add jobs.

In the baseline model, multiplier effects on local suppliers and retailers are assumed to equal 2.5. That is, for each new job in incented firms that would not have existed "but for" the incentive, there will be 1.5 additional jobs created in local suppliers and retailers.

The assumed multiplier of 2.5 is based on the input-output literature.[27] Multipliers for manufacturing industries are commonly found to be in the range between 2 and 3. [28]

Moretti (2010) has recent research suggesting that multipliers for some industries may be much higher. Moretti's average multiplier for manufacturing is 2.59.[29] However, for some high-tech manufacturing industries, he finds multipliers close to 6. In alternative scenarios later in this paper, I consider the effects of such higher multipliers.

The multiplier effect is assumed to take a little time to reach its full size. This lagged adjustment seems reasonable, as it takes some time for local suppliers and retailers to respond to increased demand. The adjustment rate to the full multiplier is assumed to be 50 percent per year. This adjustment rate is consistent with the time pattern of multiplier effects found in Bartik (1991) and Blanchard and Katz (1992).

Export-Base, Non–Locally Owned

In the baseline scenario, the firms receiving incentives are assumed to be 100 percent export-base firms, with all their sales of goods and services competing in a national market. But if instead the incented firm is not an export-base firm, then any increased activity of incented firms could displace a similar level of activity in competing local firms. Because non-export-base firms sell to a local market, any increased sales of incented firms will reduce sales of other local firms. For example, if we give incentives to a McDonald's franchise, the incentives might induce the McDonald's restaurant to expand. But local fast food restaurant sales as a whole are unlikely to increase much. Therefore, the increased sales of the incented McDonald's restaurant will come at the expense of reduced sales and reduced jobs at local Burger King restaurants.

In the baseline scenario, incented firms are assumed to be non–locally owned. Later in this report, I allow for local ownership. Local ownership changes the effects of incentives because locally owned firms may use more local suppliers, which will tend to increase multipliers. In addition, the incentive dollars given to lower owners will increase their income, which will both directly raise local incomes and lead to some increases in local spending and local jobs.

Job Growth Effects on Labor Market Outcomes

Incentives will have a variety of effects on net local job growth. These net local job growth effects stem from effects on incented firms and multiplier effects which have already been discussed, as well as offsetting effects that will be discussed later. The final net job effects would be expected to alter local real wages, unemployment, and labor force participation.

The real wage elasticity in response to local job growth is assumed to be 0.2—a 1.0 percent boost

27 As explored further later in this report, the effective multiplier after allowing for the effects of higher local costs and for incentive financing ends up being much less than the initial input-output multiplier.

28 For example, BEA's input-output model reports that for 17 manufacturing industries in the Kansas City Economic Area, the median jobs multiplier is 2.49, with four industries having multipliers above 3, and three industries having multipliers below 2 (BEA 1997).

29 The econometrically-estimated multiplier for tradeables estimated in Van Dijk implies an average input-output multiplier of 2.40 (Van Dijk, 2018, Table 2, Shift-Share 2SLS) for metro areas. Statewide multipliers would be higher.

to local jobs will initially boost the local real wage by 0.2 percent. This real wage elasticity is based on the literature summary in Bartik (2015). This initial real wage elasticity is assumed to depreciate by 13 percent per year, based on estimates reported in Table 1 of Bartik.

The elasticity of employment-to-labor-force ratios with respect to local job growth is assumed to have an initial value of 0.476. That is, a 1 percent increase in jobs will increase the employment-to-labor-force ratio (1 minus the unemployment rate) by 0.476 percent. An alternative interpretation: for each 1,000 jobs created, initially 476 of those jobs will go to local residents who otherwise would be unemployed. This initial effect on the employment-to-labor-force ratio depreciates by 27 percent per year. The initial effect and its depreciation are based on the median result from the estimates underlying Bartik (2015). These estimates and their depreciation are consistent with the overall research literature (Bartik 2015).

The elasticity of labor force participation rates is assumed to be 0.232. That is, a 1 percent shock to local job growth increases the local labor force participation rate by 0.232 percent—out of every 1,000 additional jobs, 232 would go to local residents who otherwise would not be in the labor force. These labor force participation effects are based on estimates reported in Bartik (2015).

How persistent are labor force participation effects over time? Bartik (1991, 1993a, 2015) estimates that labor force participation effects of labor demand shocks are quite persistent, with modest if any depreciation over periods of a decade or so. In contrast, Blanchard and Katz (1992), in a widely cited paper, find moderately rapid depreciation of labor force participation effects of local job growth. However, Bartik (1993a, 2015) suggests that the Blanchard and Katz result is overturned in more robust and general models, which better capture what labor demand shocks do in the long run.

Why might labor force participation be affected persistently? As explored fully in Bartik (1991), perhaps because local job growth increases labor market experience and job skills. Due to local job growth, some individuals who were out of the labor force gain valuable labor market experience, as well as greater self-confidence and a better reputation with employers. With better skills and a better perception of their skills, these local residents can continue to be more productive and hence more likely to be employed.

Although the labor force participation effects of labor demand might be very persistent, would these effects be truly permanent? If these effects are due to the long-run employability benefits of short-run labor market experience, we would not expect these effects to remain completely unaltered over time. We would expect that as individuals retire, move out of the local economy, or die, the initial effects on labor force participation rates will eventually show some depreciation and, in the very long run, will completely depreciate. [30]

To reflect this short-run persistence and long-run depreciation of labor force participation effects, I estimate how labor force participation rates will eventually depreciate because of three forces: 1) out-migration, 2) mortality, and 3) changing labor force participation due to aging. This model ends up with quite persistent labor force participation effects: such effects are 82.0 percent of their

30 This could be argued to be a conservative assumption. For example, research by Greg Duncan and his colleagues suggests sizable causal effects of parental income upon children's future academic achievement and income (Duncan, Morris, and Rodrigues 2011; Duncan, Ziol-Guest, and Kalil 2010).

initial level after 10 years. This is an effective annual depreciation rate of 2.2 percent, far less of a depreciation rate than is the case for unemployment effects or wage effects.[31] But these effects eventually dramatically depreciate: labor force participation effects are 0.7 percent of their original level after 60 years. The average depreciation rate over this entire period from Year One to Year 60 is 8.2 percent per year. By 60 years after the shock, most of the original labor force has either retired, moved to another state, or died. Appendix C provides more details on how these labor force participation depreciation rates are calculated.

The net effects on jobs, together with the resulting effects on the unemployment rate and the labor force participation rate, result in effects on how many local residents get jobs out of the total new jobs available. The remaining new jobs will go to in-migrants. These migration effects are used to estimate the effect of incentives on local population. Local population will affect fiscal benefits by affecting needs for public spending.

These effects on labor market outcomes will vary with the initial local unemployment rate. In the model of Bartik (2015), the effects of demand shocks to local jobs on wages, the unemployment rate, and the labor force participation rate vary with the baseline overall local unemployment rate. Higher overall local unemployment rates yield lower effects of demand shocks to local jobs on raising real wages, and higher effects on reducing unemployment and increasing labor force participation.

In the baseline model, initial local unemployment is assumed to be 6.2 percent, which is the mean local unemployment in the data used in Bartik (2015). The initial local unemployment is assumed to converge at 10 percent per year to long-run unemployment of 4.5 percent.[32]

Job Growth Effects on Real Estate Markets

The baseline model assumes a property value elasticity of 0.451, from Bartik (1991). For each 1 percent increase in local jobs, local housing prices and other real estate prices increase by 0.451 percent. The increased real estate prices are due to more jobs and population creating more real estate demand. The supply of housing and other real estate responds to some extent, but not perfectly elastically, so property prices are bid up. The Bartik elasticity is consistent with results for the average metropolitan area in Saiz (2010). The capital gains from higher local real estate prices are counted as local income gains if the property is owned by local residents.

Effects on Overall Employment of the Increased Wages and Real Estate Costs

Higher wage and real estate costs[33] feed back into the local economy to reduce future employment, dampening the net job increase.[34] I use the same cost-increase sensitivity for other local employ-

31 This is calculated over the nine-year period from Year 1 to Year 10.

32 The model's job shocks are assumed to be small enough that effects on overall unemployment will not alter model dynamics.

33 Higher annual real estate rental costs are calculated by multiplying the increase in property value times an assumed ratio of annual rentals to property values. See Appendix C for more details.

34 As a slight offset to these negative feedback effects, the increase in property values is allowed to have some slight positive effects on local demand, due to a wealth effect. See Appendix C for details. In the case of demand effects of

ment[35] that is used with incented firms, with three exceptions:

1) Changes in wages are assumed to have 30 percent of the effect on local employment that would be expected based on how wages affect costs. This assumption is based on empirical evidence, which finds that for a cost increase due to wages, the business location response is less than it would be from a similar-size cost increase due to increased state and local business taxes (Bartik 1991).[36] A plausible explanation is that real wage increases have some offsetting benefits for productivity. The model's effective long-run elasticity of local jobs with respect to real wages is −1.5, which is within the range of estimates in the literature (Hamermesh 1993).[37]

2) Unlike the case of incented firms, the effects of these wage and real-estate cost increases on other employment do not have multiplier effects. Estimates of the cost sensitivity of overall employment to wages or business taxes already implicitly incorporate such multiplier effects.[38]

3) To reflect lagged adjustment, other overall employment only gradually adjusts to the new higher cost structure. The adjustment rate is 9 percent per year toward the new equilibrium, based on estimates by Helms (1985) and Bartik (2017a). This lagged adjustment contrasts with the response of incented firms, which is assumed to be immediate. For incented firms, the baseline model assumes we are targeting new location or expansion decisions. The adjustment of marginal investment decisions to the lower costs due to incentives is assumed to be immediate.

Offsets from the Opportunity Cost of Financing Incentives: Demand-Side Effects

The incentive's dollar costs must be paid for by state and local governments.[39] Either state and local taxes must go up, or public spending must be lowered, or both. The financing of incentives will reduce employment because of demand-side and supply-side effects of higher taxes and lower public spending. "Demand-side" effects are the reduction in demand for local goods and services

---

the changes in wages, this is assumed to already be reflected in the regular multiplier effects.

35 In particular, the long-run elasticity of other local employment in response to increased local nominal costs, due to real estate price increases, is assumed to be the same as the long-run responsiveness to business taxes or incentives.

36 In Bartik (1991), the average elasticity of state and local business activity with respect to wages is −0.70; the average elasticity of state and local business activity with respect to state and local business taxes is −0.25. State and local business taxes are 5 percent of overall value-added, versus about 50 percent for wages. With an elasticity of state and local business activity with respect to state and local business taxes of −0.25, we would expect the corresponding wage elasticity to be 10 times as great, at −2.5. The actual estimate of −0.70 is 28 percent of the expected elasticity.

37 Hamermesh suggests a range for the labor demand elasticity with respect to wages, not holding output constant, from −1.0 to −1.5. Kline and Moretti (2013) assume an elasticity of −1.5 in the regional context. Beaudry, Green, and Sand (2014) have estimates that imply a long-run metro area elasticity of about −1.5. My assumptions yield an effective elasticity of −1.5. This is consistent with these prior researchers. My assumed real wage elasticity is more negative than the −0.70 found in Bartik (1991) to summarize the relevant regional literature. However, it can be argued that the research literature's average wage elasticity is biased towards zero by the endogeneity of wages.

38 In other words, the overall employment elasticity estimated with respect to wages or other costs incorporates both the export-base and non-export-base sectors, including whatever multipliers occur for each sector.

39 Any fiscal benefits, because of the incentive's effects on state and local taxes and public spending needs, may reduce the incentive's net fiscal costs. These fiscal benefits are allowed for in the model and are discussed later.

because of higher taxes and lower public spending. "Supply-side" effects are the reduction in the supply of business capital or skilled labor due to at least some types of higher taxes and lower public spending. In this subsection, demand-side effects are considered.

The costs of paying for incentives may be relieved to some extent by the fiscal benefits of the incentives, to be discussed further below. These fiscal benefits are assumed to be distributed in the same way as the incentive costs between spending and taxes, with similar effects.

For the baseline model, it is arbitrarily assumed that incentives are financed 50 percent by public spending cuts and 50 percent by tax increases. The demand-side impacts of public spending cuts are based on a recent paper by Suarez Serrato and Wingender (2016). This paper estimates the local "fiscal multiplier" effects of state and local public spending induced by changes in federal grants due to updated census population estimates. Based on their paper, I assume that spending cuts, by reducing both public jobs and local demand for private jobs, will have a ratio of spending cuts to job reductions of $33,963 per full-time-equivalent job.[40]

Tax increases are divided between business taxes and household taxes. Based on estimates from Ernst and Young (Phillips, Sallee, and Peak 2016), the business share of state and local taxes is assumed to be 44.1 percent.

The local demand-side effects of higher taxes are derived from Zidar (2017). Zidar estimates the local economic effects of much higher or lower taxes for different income groups in the state due to changes in federal taxes. Based on Zidar's results, the local demand-side impact of higher taxes depends upon the division of those taxes between the bottom 90 percent of the income distribution and the top 10 percent. Zidar estimates that tax increases on the bottom 90 percent will reduce local jobs, with a ratio of tax increases to job reductions of $39,177 per full-time equivalent job.[41] In contrast, tax increases on the top 10 percent are found to have no local demand-side effects. These results from Zidar make sense. For the bottom 90 percent, spending on local goods and services is constrained by disposable income after taxes. In contrast, the wealthiest taxpayers do not adjust their consumption of local goods and services by much in response to tax-induced changes in net income. However, note that when tax increases on the top 10 percent come in the form of higher business taxes, they may reduce business investment in the state. This will be discussed in a little bit.

To determine how much of an increase in household taxes goes to different income groups, I use tables from the Institute on Taxation and Economic Policy (ITEP 2015). Based on ITEP figures, household taxes at the state and local level are allocated 58 percent to the bottom 90 percent of the income distribution and 42 percent to the top 10 percent.[42]

For business taxes, I use U.S. Department of Treasury incidence assumptions for the corporate income tax, which assume that the top 10 percent of the income distribution bears 66.8 percent of

---

40 Bartik (2017b) explains how this number is derived from Suarez Serrato and Wingender (2016). This spending cut to FTE job ratio is the 2015 ratio. As mentioned above, this is assumed to increase annually by 1.2 percent.

41 Bartik (2017b) explains in detail how this effectiveness ratio is derived from Zidar's estimates. This $39,177 is the initial 2015 value, which is assumed to annually increase by 1.2 percent because of overall productivity growth in the economy.

42 The ITEP incidence numbers for different types of household taxes are based on what would be considered mainstream public finance assumptions. Therefore, although one could quarrel with some of the details of the ITEP assumptions, I think it unlikely that there would be dramatic disagreement from most public finance economists.

the burden of this business tax (Cronin et al. 2013).[43] This reflects assumptions about how much in business taxes are borne by supernormal profits and economic rents, as opposed to being passed on to workers. Demand-side effects of business taxes are further reduced because the model assumes that only 26.0 percent of state and local business taxes are paid by businesses owned by local residents.[44] Therefore, the only demand-side impact of business taxes stems from the 26.0 percent borne by locally owned businesses. Only 33.2 percent of such local business income is received by the bottom 90 percent of the income distribution and thereby affects local demand. Business taxes that are "exported" to out-of-state business owners have zero local demand effects, and business taxes paid by local owners in the top 10 percent of the income distribution also have zero effects on local demand.

Financing of Incentives: Supply-Side Effects of Higher Business Taxes

However, although business taxes do not have much demand-side impact on local economies, higher business taxes will have adverse impacts on local jobs by increasing business costs. This is a "supply-side" impact because these higher business costs reduce the supply of business capital investment to the state economy.

In the model, I assume a business cost response that is the same as that assumed in estimating effects of incentives. In the long run, a business tax increase of 1 percent of business value-added will reduce other private business employment by 10 percent.

However, this long-run equilibrium elasticity of business response is only reached gradually, as general business-tax increases target all businesses, both existing ones as well as businesses considering expanding. The adjustment to the long-run equilibrium is assumed to be 9 percent per year, based on Helms (1985) and Bartik (2017a).[45]

Financing of Incentives: Negative Effects of Lower Public Spending on Education

Many reductions in state and local spending might have negative effects on the supply of labor or capital or other inputs to business production. Cuts to any type of education or job training spending might hurt local labor skills and hence local productivity. Cuts in higher education spending might harm local business research, which might reduce high-tech business investment and business productivity. Cuts in road spending and other infrastructure might raise local business costs and thereby reduce business investment in the state. Cuts in health spending might reduce local workforce productivity. Cuts in child care spending might reduce the ability of parents to

43 The Cronin et al. (2013) figures in their "New methodology" column of Table 5 are slightly adjusted so that they sum to 100 percent.

44 This is derived from assuming that 10 percent of nonfinancial corporate businesses are owned locally and 50 percent of nonfinancial, noncorporate businesses are owned locally. I then combine these assumptions with information from the U.S. Federal Reserve Board (2017), Tables B103 and B104, on the allocation of total business capital by these two categories as of 2016. Capital included is real estate, machinery and equipment, and intellectual property.

45 In addition, no multiplier effects are allowed for, as the estimated elasticities already reflect that business tax changes affect both export-base and non-export-base businesses. The overall elasticity implicitly incorporates multiplier effects for the export-base businesses and no effects for the non-export-base businesses.

work, thereby reducing local labor-supply quantity in the short run, and in the long run reducing labor-supply quality by reducing parents' work experience.

In the baseline model, I assume that the only negative supply-side effects of lower public spending stem from lower spending on K–12 education. If a model user wanted to allow for impacts of other local public spending, this can be done in an ad hoc way by assuming that a larger share of public spending cuts have the same negative effect as cutting K–12 spending.

In the baseline model, it is assumed that of public spending cuts, 22.1 percent come from K–12 education spending. This is the average share of state and local direct general expenditures that goes to K–12 education, based on the latest (2014) figures from the Census of Governments.

What negative effects might lower K–12 spending have on the quality of a state's labor force? The model uses estimates from Jackson, Johnson, and Persico (2016) of the effects of K–12 spending on future wages. Their estimates are derived by examining how future wages vary with court-ordered increases in K–12 spending. This is a plausibly "exogenous" change in K–12 spending that helps get at the true causal effects of K–12 spending on future earnings.[46] The model relies upon the estimate of Jackson, Johnson, and Persico that a 10 percent change in overall per-pupil K–12 spending, over 13 years, will change the adult wage rate by 7.7 percent, an elasticity of 0.77.[47] The model analyzes the effects of reducing K–12 spending on a yearly basis.[48] Therefore, the model assumes that changing K–12 spending for one year only will have one-thirteenth of the overall impact of 7.7 percent, or about a one-half of 1 percent impact, for a 10 percent one-year change in funding.[49]

The model assumes that most of this impact takes place through wages, and takes place in equal

46 In the Jackson, Johnson, and Persico data, these court orders mainly affect spending for the bottom three quartiles of school districts in terms of spending per pupil. Therefore, these "causal" estimates only provide direct evidence of the causal effects of school spending for school districts that are in the lowest three quartiles of spending. In the later analysis, I do some sensitivity tests of what happens if one assumes much lower effects of education spending than are estimated by Jackson, Johnson, and Persico.

47 Their model implies a relatively high benefit-cost ratio for education spending, but not an unprecedented one in the research literature. Using the earnings data from the ACS that are used for the simulation model in the current report, I calculate that the implied benefit-cost ratio for education spending from their coefficient is 4.95, using a 3 percent discount rate and assuming 1.2 percent growth in annual wages. (This omits any depreciation due to out-moving, unlike what is done in the simulation model, and also omits the agglomeration effects estimated in Moretti [2004]. The model's mortality assumptions are incorporated.) Jackson, Johnson, and Persico report a lower benefit-cost ratio of 3, but they use a 6 percent discount rate. Krueger (2003) reports a benefit-cost ratio of 2.83 (4.10) for the Tennessee class-size reduction experiment, assuming a 3 percent discount rate and annual growth rate in earnings of 1 percent (2 percent). Heckman et al. (2010) find a ratio of earnings benefits to costs for the Perry preschool experiment that, recalculated using a 3 percent discount rate, implies a benefit-cost ratio for earnings increases alone of 4.39. So the causal estimates of Jackson, Johnson, and Persico are higher than previous estimates for different types of school spending, but not implausibly so. I do some sensitivity tests of lowering their educational productivity estimates later in this paper.

48 However, in many cases an incentive policy will have net fiscal costs for many years, and not just one year. Therefore, in practice there is not a huge extrapolation from Jackson, Johnson, and Persico's estimates, which are for 13-year changes in school spending, and the estimates here.

49 This procedure implicitly assumes that education-spending changes that are due to paying for incentives will have the same effects on future wages as education-spending changes that are due to court orders. This does not seem unreasonable, as these court orders seem to increase spending without any requirement that this extra spending be used for unusually productive school activities.

percentage terms over all ages in a career. Thus, these impacts are quite delayed compared to some other policy impacts.

In addition, the model is focused on estimating impacts on local residents. Therefore, the effects of K–12 spending are reduced by allowing not only for mortality between the K–12 years and later ages, but also for out-of-state migration. Only wage effects for workers who stay in their original state are counted. The survival probabilities are based on Life Tables from the U.S. Department of Health and Human Services and are ratios of the number of persons surviving to a later age to the number of persons who are at a particular age that corresponds to the K–12 grade when the change in school spending takes place. The staying probabilities are estimated by looking at the ratio from the U.S. Census Bureau of persons living in their birth state as of some later age to persons living in their birth state as of some earlier K–12 age when the change in K–12 spending takes place. These staying probabilities average 65 to 75 percent for most of the typical worker's career in a typical state.[50]

Based on estimates by Moretti (2003, 2004, 2012) and Diamond (2013), changes in some local residents' skills should have spillover effects on the productivity and wages of other state residents. Estimates suggest that an individual worker's wages depend not only on his or her own education, but also on the average education of fellow local residents. These spillover effects may be due to teamwork effects within a firm or agglomeration effects across firms, in which firms steal ideas and workers from one another. Based on Moretti's results, the model assumes an education spillover of 86 percent.[51] That is, each $1 reduction in local wages that is directly brought about for persons impacted by K–12 education spending cuts will result in a total of $1.86 in total wage reductions in the local economy.

The wage rate changes due to lower K–12 spending are assumed to be matched by changes in labor productivity, and therefore they have no impact, positive or negative, on whether businesses locate in the state.

In addition to these pure "supply-side" impacts of lower K–12 spending, the resulting lower wages are assumed to have some distributional demand-side effects on local job creation. The proportion of the reduced wages that go to the bottom 90 percent of the income distribution are calculated (see below for more on how this is done), and the fiscal multiplier derived from Zidar (2017) is used to calculate the resulting impact in destroying jobs.[52]

---

50 Obviously, these cross-sectional staying probabilities based on living in the birth state do not perfectly estimate what happens to the location choices of an average person followed over time. However, in work with the Panel Survey of Income Dynamics, I have found that these staying probabilities roughly match what would be obtained from such panel data, up to the top ages at which the PSID has sufficient sample size to be usable.

51 This ratio, based on Moretti, was previously calculated in Bartik, Hershbein, and Lachowska (2016). Moretti's (2004) estimates cluster around finding that a 1 percentage point increase in college graduates has an effect on others' local earnings of around a 1.2 percent increase. Bartik, Hershbein, and Lachowska estimate that getting a college degree, compared to a high school degree, increases an individual's earnings by 140.3 percent. Therefore, the individual effect of 1 percent more of the population getting a college degree is about 1.4 percent (1 percentage point times 140.3 percent), and the external effect is 1.2 percent. The total effect on local earnings of a 1 percentage point boost to local college graduates is therefore 2.6 percent. The ratio of this total effect to the individual effect is 2.6/1.4 = 1.86. I assume this "agglomeration economy multiplier" effect of education due to increased college graduates can be applied to local skill changes due to changing education spending.

52 The lower wages due to education cutbacks are assumed to have no corresponding demand-side effects due to

Wage Premia Effects

The baseline scenario version of the model assumes that the incented jobs pay no wage premium relative to the average job. That is, although the jobs may pay above-average wages or below-average wages, these wage differentials are exactly what can be expected based on the education and other credentials of the hired workers. The multiplier jobs and other jobs in the model are not assumed to have any wage premia on average.

However, some alternative scenarios do allow incented jobs to pay a wage premium. This wage premium for incented jobs, when it exists, proves to have significant effects on the benefits of incented jobs.

"High wage premium" jobs are not necessarily the same as high-wage jobs. What is key is the wage paid relative to the credentials of workers. For example, some high-tech jobs may pay high wages, but if these jobs expect workers to have a PhD, then these jobs might not pay a positive wage premium. More modestly paid factory jobs may pay a high wage premium if these jobs only require workers to have a high school diploma.

Firms or industries may pay a wage premium for a variety of reasons. Institutional factors such as unionization may play a role. Some firms or industries may find it in their interest to pay higher "efficiency wages" (Akerlof and Yellen 1986; Dickens and Katz 1987). By paying higher wages than normal, an employer can readily recruit good workers, reduce worker quits, and motivate workers. Empirically, many manufacturing jobs traditionally have paid wage premia (Katz and Summers 1989), although this may be less true today, because many manufacturing industries have faced serious economic challenges. In addition to wage premia varying across industries, wage premia may vary with an individual firm's wage strategy (Barth et al. 2016; Groshen 1991).

This wage premium is an extra benefit of the creation of the incented jobs. Based on estimates from Beaudry, Green, and Sand (2012), the dollar increase in overall local wages is assumed to be 7 percent less than expected based solely on what happens to the incented firms—an elasticity of 0.93.[53]

Why do I assume a zero-wage premium in the baseline scenario? Because a wage premium is a labor market benefit, it is reasonable to expect economic developers to seek to target high-wage-premia firms. In addition, the manufacturing firms that are a key part of most states' export base have traditionally paid a wage premium.

On the other hand, in today's economy, many businesses face pressures from financial markets to control labor costs, which restricts the freedom to pay wage premia. Furthermore, with economic developers needing to show good job numbers, it is challenging to be selective about job quality.

benefits for firms, as it is assumed that the lower wages correspond to lower skills, and hence have no net effect on business income. In addition, even if there were some net business income effects, 74.0 percent of businesses are assumed to be owned out-of-state, and 78.9 percent of business income, based on CBO estimates, is assumed to go to the top 10 percent, so any demand impact due to changes in business income would be muted.

53 This assumption is conservative. Beaudry, Green, and Sand (2012) only incorporate wage effects of wage premia and find this slight 7 percent depreciation in local impact. In Bartik (1993b), I estimate models that also allow for high-wage premia industries to affect local earnings by effects on working time, and I find an overall wage premia multiplier of 2.84. Such a high multiplier probably is more than a supply-side response of workers; it probably also reflects that higher-wage-premia employers may have different hiring practices.

Empirically, incentive awards do appear to go up some with higher wages, but by very little. For the average state, a 10 percent increase in an industry's wages is associated with only a 2.68 percent higher incentive offer (Bartik 2017a). Given that even these higher wage jobs may not pay a higher wage premium, it seems unlikely that there is much correlation between incentive offers and a firm's wage premium for the average incented project. Therefore, it seems prudent in the baseline scenario to assume incented firms on average pay no wage premium, but to allow for such wage premia in alternative scenarios.

Fiscal Effects

The incentive-induced increase in employment will usually be greater than the increase in population. Since revenue tends to go up with employment, and spending needs go up with population, there is some tendency for state and local tax revenues to go up faster than spending needs. However, the fiscal benefit also depends on how each tax base varies with employment.

State personal income is assumed to have an elasticity with respect to employment of 1.0. The model then tracks what happens with the main components of state and local general revenue. The main general revenue sources are assumed to vary in the following ways:

- Federal government revenue goes up proportionately with population.
- Property taxes have an elasticity with respect to personal income of 0.86 (that is, a 10 percent increase in personal income increases property tax revenue by 8.6 percent based on Anderson and Shimul [2012]).[54]
- Income taxes have an elasticity with respect to personal income of 1.832 (Bruce, Fox, and Tuttle 2006).
- Sales taxes and all other revenue categories have an elasticity of 0.811 with respect to personal income (Bruce, Fox, and Tuttle 2006).

The net effect is that overall state and local tax revenue tends to grow at a slightly slower rate than state personal income—in the long run, about 99 percent as much.

For public spending, all types of direct general expenditures are assumed to experience increased "need" that scales proportionally with population.

These elasticities are combined with census data on average dollar values for all state and local governments of various types of direct general revenue and direct general expenditure. The combination yields dollar effects upon different revenue categories, and on general expenditure needs.[55]

The resulting calculations yield annual fiscal benefits or costs. These fiscal benefits or costs are fed

54 This overall property tax elasticity is assumed to reflect average job growth effects on property wealth in the average local area. However, the model allows for higher property wealth effects if the baseline model is altered to allow for different-from-average housing price elasticities.

55 As detailed in Appendix C, these calculations also need estimates of total full-time-equivalent (FTE) employment, total personal income, total population, and total property wealth.

back into the model and divided among spending and tax categories in the same way as incentive costs, with supply-side and demand-side effects upon the state economy.

Effects on Profits of Business Owners

Business owners' profits are affected by increases in local costs that cannot be recovered by higher prices, and by the profit effect of any incentives received. In the model, only effects on the income of local residents are counted. Therefore, effects on business owners are only counted if these business owners are local residents.

The model assumes that 26.0 percent of businesses in the local economy are owned by local residents.[56] These are the only businesses whose profit effects due to higher costs are counted in the model. For cost increases that are directly or indirectly due to higher real estate costs, I assume that for local-resident-owned businesses that sell to a local market, any cost increases are completely reflected in higher prices of local goods and services, with no profit effect. Therefore, the only real estate cost increases that reduce the profits of businesses owned by local residents are for such businesses that sell to an "export-base" market—that is, that sell outside the local economy. I assume that the export-base share among locally owned businesses is half the overall average. Based on the full set of 45 export-base industries defined in Bartik (2017a), and on 2015 industry data from BEA, 43.5 percent of value-added in the United States is in export-base industries, so the assumed percentage of export-base businesses among locally owned businesses is 21.8 percent.[57] Therefore, the cost increases due to higher real estate prices have a much-diminished net effect on the profits of locally owned businesses compared to the total increase in real estate rental prices. The assumed effect on annual real estate rents is multiplied by 26.0 percent times 21.8 percent, or 5.6 percent.

The model generates some temporary effects of labor demand shocks on increasing real wages (see discussion above). As with real estate prices, I assume that the only businesses affected by real wage increases are export-base businesses that are locally owned, which from above is equal to 5.6 percent of all businesses. However, as noted above, there is some possible effect of higher real wages on increasing productivity, as inferred by the empirical finding that higher real wages do not have as great an effect on business location decisions as is true for other cost increases. The assumed downweighting of real wage effects on location decisions is to multiply these real wage increases by 0.3. This is consistent with a model in which real wage increases of x percent increase productivity by 0.7 times x percent, with a net increase on costs of 0.3 times x percent. Therefore, in determining the profit loss for locally owned export businesses from real wage increases, I multiply such real wage increases by 0.3 to reflect these productivity effects of real wage increases.

56 This percentage is based on assuming that 10 percent of nonfinancial corporations are locally owned and 50 percent of nonfinancial businesses that are unincorporated are locally owned. I combine this with data on the total real estate, machinery and equipment, and intellectual property owned by these two types of businesses, as of the end of 2016, from Tables B103 and B104 of the Federal Reserve System's *Flow of Funds Report* from the second quarter of 2017. Relative profits of the two sectors are assumed to be allocated with relative holdings of all types of capital. This calculation suggests 26.0 percent of business profits go to local owners.

57 These calculations are based on the full set of 45 export-base industries initially identified in Bartik (2017a), not the later, more restricted set of 31 export-base industries.

As a result, the initial increase in real wages ends up being translated into a much smaller loss for businesses, being multiplied by 5.6 percent times 0.3, or 1.7 percent.

In the baseline scenario, all incentives are assumed to go to businesses that are not locally owned. Therefore, in the baseline scenario, incentives have no direct effects on the profits of local residents who happen to be local business owners, although of course there are indirect effects. In some alternative scenarios, incentives can go to local owners. In those cases, the model calculates how much such incentives will increase profits, with this calculation based on incentive costs, the assumed effectiveness of incentives in reducing business costs per dollar spent, and the assumed adjustment costs of local owners in changing employment and output in response to incentives.[58] More details will be discussed when those alternative scenarios are presented.

Summary of Net Income Effects

The model then gathers together the various effects, and it estimates overall effects on different types of local residents' income. These estimated overall effects include the following:

- Effects on costs for state/local taxpayers, due to both direct incentive costs and the various fiscal benefits or costs that stem from incentive policy
- Effects on labor market incomes due to the increased employment-to-population ratios, higher wage rates from a tighter labor market, and higher wage rates from the incented jobs' wage premium
- Effects on local income from capital gains on local real estate, as a result of increased local employment increasing real estate demand relative to supply
- Effects on losses of future wages of local residents due to lower education spending
- Effects on lower profits of local businesses from higher costs, but counterbalanced in some model scenarios if locally owned businesses receive incentives

To avoid double-counting tax revenue benefits, the last four categories are calculated as net changes in income after state and local taxes. This is done by multiplying the gross income changes by an assumed average state and local tax rate, and then subtracting out this approximate tax revenue figure from the gross income figure. This procedure avoids counting taxes as a benefit in the fiscal benefit calculations without accounting for taxes' costs.

To cut down on how many numbers are presented, most of the numbers presented in this report are based on calculations of the present value of these net income gains for local residents over 80 years.

58 In addition to affecting the income of local business owners, this incentive income will have some demand effects on the local economy, which is discussed further below and in Appendix C. In addition, Appendix C has more details on how these adjustment costs cause profit increases to be somewhat less than the dollar value of incentives times their effectiveness ratio. There is a need for an adjustment by what is known by public finance economists as a "Harberger triangle."

Dividing Costs and Benefits by Income Quintile

After calculating overall local benefits and costs, these different types of benefits and costs are then divided by income quintile, as follows:

- The nonbusiness portion of any increased taxes is divided among income quintiles in the same way as is implied by the average state and local personal tax rates (including income taxes, sales taxes, and property taxes) calculated in ITEP (2015). This leads to a somewhat regressive distribution of these taxes across income quintiles, as state and local personal income tax rates are relatively flat, and sales taxes are regressive.[59]
- The business portion of increased business taxes is divided among income quintiles based on the assumed incidence of business taxation by quintile from IRS research (Cronin et al. 2013). Because this research suggests that most of business taxation falls on supernormal profits, and thus is allocated with capital income, most business taxation is assumed to be borne by the top income quintiles. For example, this model suggests 76.8 percent of business taxes are paid by the top income quintile.[60]
- The costs of spending cuts are divided among income quintiles based on Tax Foundation data (Prante 2013) on how the benefits of state and local public spending are divided by quintile. Because these data suggest that state and local public spending is progressively distributed by quintile, public spending cuts have regressive effects on the income distribution.[61]
- Employment rate effects on earnings, and wage effects due to demand shocks to employment, are divided across income quintiles based on how the earnings effects of labor demand shocks vary by quintile in Table 2 of Bartik (1994). Increased earnings due to positive labor demand shocks have moderately progressive effects on the income distribution, with the dollar benefit by income quintile making up a greater percentage of income for lower-income quintiles. This is particularly true for the bottom three income quintiles. There is a significant break in the benefits from labor demand shocks as we go from the middle-income quintile to the next-to-highest-income quintile. The highest-income quintile and the next-highest-income quintile gain less than their baseline income shares from shocks that increase local labor demand. However, the absolute dollar benefit of increased earnings due to positive labor demand shocks tends to go up with household income.[62]

59 As mentioned above, ITEP uses mainstream assumptions about tax incidence. Most public finance economists would agree that state and local nonbusiness taxes are regressive in their incidence.

60 The Cronin et al. (2013) figures are adjusted so that incidence breakdowns by quintile and other income groups sum to 100 percent.

61 I use the Tax Foundation estimates based on the benefit principle, which assumes that public goods are more highly valued by higher-income households. I include education spending cuts in these calculations. I do not regard this as double-counting, even though later the model estimates the costs of education spending cuts in terms of lower future wages for children. I view the estimated cost of education spending cuts in the Tax Foundation–based calculations as reflecting the dollar value that parents might place on education spending independent of effects on their child's future income—for example, because of its value as child care, or because of the nonpecuniary benefits of education for children.

62 As a result, demand shocks to labor market earnings are not distributed as progressively as are wage increases due to greater education spending. See the below discussion of education spending's distributional effects.

- Effects of wage premia paid for incented jobs are derived by dividing effects by CBO figures on the share of each income quintile in total labor earnings (CBO 2016, Table 6, in Supplemental Data Appendix). These wage premia effects are distributed roughly proportionally to total income, reflecting CBO's findings that quintile shares in labor income and total income are quite similar.

- For property values, homeownership capital gains are divided by quintile using Federal Reserve data on homeownership rates and mean home value by quintile. Real estate capital gains for locally owned businesses are divided according to capital income by quintile. These property value capital gains are distributed regressively: initial income shares go disproportionately to upper-income quintiles.

- The effects of education cutbacks are divided across income quintiles based on estimates from CBO (2016) of the total number of households with children in each income quintile.[63] This relatively even distribution of these wage costs across quintiles results in a highly regressive impact of education cuts on the income distribution, as such cuts lead to larger wage cuts as a percentage of initial income for lower income quintiles.

- The effects of cost-induced changes in business income for locally owned businesses are divided among quintiles by how capital income varies by income quintile, based on CBO (2016). In alternative scenarios, when incentives go to locally owned businesses, various assumptions are made about how incentives to locally owned business will be distributed by income quintile. These assumptions will be discussed when these alternative scenarios are considered.

Of these assumptions, the most important is the assumption that the dollar benefits of changes in educational quality are close to evenly distributed by income quintile. This assumption is supported empirically by Chetty et al.'s (2011) research that shows that changes in education quality—in their example, kindergarten class quality—seem to show similar dollar effects on earnings at different points in the percentile distribution of test scores. Improvements in kindergarten class quality cause similar dollar increases in future income for children who otherwise would be at quite different test-score levels. This assumption is also supported by results from Bartik, Gormley, and Adelstein (2012); these results show that providing high-quality preschool is likely to cause similar dollar changes in future income for children from low-income families as for children from middle-income families.

Some support for this assumption is also provided by the estimates in Jackson, Johnson, and Persico (2016) that break down the effects of public school spending on future wage rates for children from different income backgrounds. In particular, their point estimates of effects of K–12 school spending on future wages are higher for children from low-income households than for children from non-low-income households.

Furthermore, the estimated effects of school spending on future wages for children from non-low-income households are not statistically significantly different from zero. Based on this result from

63 The same procedure is used to allocate wage losses due to education cutbacks between the top 10 percent of the income distribution and the bottom 90 percent. This was used as described above to determine how lower wages from education cutbacks lead to demand effects that destroy jobs.

Jackson, Johnson, and Persico (2016), it could be argued that the estimated income distribution effects assumed here are conservative: the model assumes the same dollar benefits per child by quintile, whereas the results from Jackson, Johnson, and Persico suggest that cutbacks in education spending for upper-income quintiles might have no effects.[64]

Why might education spending cutbacks have similar or even larger dollar effects per child for children from lower income quintiles? One could argue that children from low-income households may be more dependent upon school inputs for learning because neighborhood problems, family problems, and low family income may reduce nonschool learning. In addition, the public schools that lower-income children attend may have lower spending relative to their educational challenges than is true of more middle-class schools.

64 The information in Jackson, Johnson, and Persico does not allow a full calculation of the relative dollar effects of school spending on the future earnings of persons from low-income backgrounds versus non-low-income backgrounds. They only report effects on the logarithm of wages for the two groups, and on average wages at age 30, but do not report either annual work hours for the two groups or effects of school spending on annual work hours. If annual work hours were the same in the two groups, and were unaffected by school spending, then the reported coefficients imply higher dollar effects of school spending on the earnings of persons from a low-income background. Under those assumptions, the relative dollar effect on earnings of the two groups would be proportional to the elasticity of ln wages with respect to ln school spending for the two groups, times the relative wage rates of the two groups. The elasticity of wages is 0.9598 for the low-income group and 0.5525 for the non-low-income group (Jackson, Johnson, and Persico 2016, Table IV), and the wages at age 30 are $10.60 for the low-income group and $13.60 for the non-low-income group (p. 165). If work hours are unaffected by school spending, and work hours are the same in the two groups, the ratio of dollar earnings effects of school spending in the low-income group to the non-low-income group will be 1.354 = (0.9598) × (10.60) / [(0.5525) × (13.60)]. I would assume that work hours are higher in the non-low-income group, but members of the low-income group might be more likely to have their work hours affected by school spending. These two effects go in opposite directions.

BASELINE SCENARIO RESULTS

I begin by showing the results from the model with baseline assumptions, as outlined above. I first present summary effects on jobs over the entire 80-year period of the simulation, followed by showing job effects by year. I then present summary effects on the present value of net income of various types, followed by showing net income effects by year. This baseline-results section finishes by showing effects on different types of income for different quintiles of the income distribution.

Summary over All Years of Job Effects

To summarize the baseline model's effects on jobs, I report the effect on the "present value" of jobs (Table 2). These present-value calculations consider effects on future job-years, in each year of the model's 80-year time horizon, and discount those future job flows at 3 percent back to a Year One equivalent value. In other words, a job-year in Year Two is divided by 1.03 to get a Year One equivalent value, a job-year in Year Three is divided by 1.03 squared, etc.[65] I report absolute number of job years, and I also report job years as the percentage of the present value of job years of 10,000 incented jobs over 80 years.

As shown in Table 2, incentives have a low batting average. These incentives are "large" in the sense that these hypothetical incentives, provided for 10,000 jobs, have a present value of $508.5 million. But these incentives are also small relative to the value of the incented firms' production, with a present value of only 1.24 percent of the present value of the value-added associated with these 10,000 jobs. Because the incentives are only 1.24 percent of value-added, and incented firms are only modestly responsive to incentives, these incentives tip only 11.70 percent of all location decisions.[66] In about seven out of eight cases (88.30 percent), the incented jobs would have located in the state anyway.[67]

In contrast, many analyses of incentives by economic development agencies assume that 100 percent of the incented jobs would not have located in the state "but for" the incentive. This common assumption results in the jobs impact of incentives being overstated eightfold.

These incented jobs and their costs lead to various multiplier effects and offsets. The multiplier effects come close to increasing the job impact by two-and-a-half times. But then the various offsets from higher wage and property-value costs, and the impacts of financing the incentives, offset most of the multiplier effects. We end up with a net job impact on local jobs that is 16.45 percent of the originally incented jobs.

65 What does it mean to discount a job-year if job-years are not measured in dollars? One way to view this is that each job-year has some social value, and the discounting expresses those future job-years in the social value units of jobs in Year One.

66 If the sensitivity is −10, why isn't the effect on the location probability 1.24 percent × 10 = 12.4 percent? The reason is that the −10 sensitivity is an elasticity that relates the logarithmic effect on employment to the logarithmic cost. Given that the cost sensitivity is an elasticity, the actual effect as a percentage of final employment of the incented facility is 1 minus (1 minus percentage effects on costs of the incentive) taken to the power of 10. The resulting effect is 11.70 percent. See Appendix C for more details.

67 As mentioned above, another interpretation is that without incentives, local economic activity, from jobs that would have been incented or other jobs, would be 88 percent of what is observed with incentives.

Table 2 Summary of Present Value of Job Impact of Incentives, Incorporating Multipliers and Offsets

		As % of incented jobs' present value
Present value of incentive costs (in millions of 2015 $)	(508.5)	
Present value of job years of incented jobs	311,068	100.00
PV of induced jobs ("but for" jobs) in incented firms	36,404	11.70
PV of induced jobs plus multiplier jobs	89,305	28.71
PV of lost jobs due to increased real wages	(1,859)	(0.60)
PV of lost jobs due to higher property values and other local costs	(24,085)	(7.74)
PV of net job creation after multiplier and lost jobs due to higher wages and local costs	63,360	20.37
PV of jobs lost due to D-side impacts of public spending cuts	(4,348)	(1.40)
PV of jobs lost due to D-side impacts of tax increases	(1,370)	(0.44)
PV of jobs lost due to S-side impacts of business tax increases	(3,374)	(1.08)
PV of jobs lost due to lower earnings because of K–12 ed spending cuts	(3,107)	(1.00)
PV of net jobs (induced plus multiplier minus offsets)	51,161	16.45
PV of net jobs that go to local residents	7,731	2.49
PV of net increased earnings for local residents (after taxes) due to increased employment-to-population ratios (in millions of 2015 $)	421.5	

NOTE: Table traces out various job consequences of incentives for different categories of jobs created over 80-year time period since incentive package was provided to firms that "created" 10,000 jobs in Year One. Real discount rate of 3% annually is used to discount future job years. Lost jobs are shown as negative numbers in parentheses.
Incentive costs and net increased earnings for local residents are shown as present value, using a 3% discount rate, in millions of 2015 $. Incentive costs are shown in parentheses, as this is cost, and therefore should be subtracted in calculating net benefits. Negative numbers are indicated in this report by being put in parentheses.
Present value of job years of incented jobs assumes 10,000 jobs that stay the same for 80 years, due to incentives after Year 20 that offset depreciation.

As a comparison, input-output models such as IMPLAN, which are commonly used in economic development evaluation, would estimate the raw multiplier without offsets from higher costs or financing the incentives. With a multiplier of 2.5, the impact would be 28.71 percent of the originally incented jobs. This simplified input-output approach overstates the net jobs impact by 42 percent (16.45/28.71 = 0.58).

More complex and costly regional econometric models, such as REMI, would include job offsets due to higher wages and housing prices. But without careful use of regional econometric models by users, the model might not necessarily include job offsets due to financing the incentives. Therefore, naive use of regional econometric models might lead to net job creation estimates of 20.37 percent of the originally incented jobs. Ignoring such financing effects overstates the net job impact by 19 percent (16.45/20.37 = 0.81).

Of those incented jobs, most ultimately go to new residents and hence have no impact on raising local earnings due to increased employment-to-population ratios. But a small portion of the new jobs do go to local residents, and we get increased job years from a higher employment-to-population ratio of local residents. This higher employment-to-population ratio is one of the main sources of local income gains. But these increased employment opportunities for local residents are less than one-sixth of the net new jobs created (2.49/16.45 = 0.15), and they comprise only 2.49 percent of the jobs originally incented.

In contrast, policymakers often speak as if all new jobs will go to local residents who otherwise would not have a job. Such rhetoric overstates the employment impact for local residents by 85 percent (2.49/16.45 = 0.15).

What policymakers may overlook is that even if the new firm does all its hiring locally, any hiring of local residents who would have been employed anyway results in a job vacancy. This job vacancy results in a hire of either an employed local resident, a nonemployed local resident, or an in-migrant. If the hiring is of an employed local resident, this results in another job vacancy, which must be filled similarly. This chain of job vacancies implies that ultimately, new jobs result in opportunities either for the local nonemployed or for in-migrants. For local residents, the ultimate impact of new job creation may differ greatly from the impact that is immediately apparent.[68]

However, even that slight job impact on local residents is enough to enormously increase earnings. In fact, the increased net earnings from the increased employment-to-population ratio for local residents is $421.5 million, which is of the same rough order of magnitude as the $508.5 million cost of the incentives (it's about 17 percent below that cost). Two key points should be understood about this result:

1) This result should not be unexpected. Because we are handing out incentives that are quite small in relation to value-added and the incented firms' wage bill, even a low batting average for incentives can result in earnings benefits of the same order of magnitude as incentive costs. Because wages are about half of value-added, incentives that are 1.24 percent of value-added will be equal to about two-and-a-half percent of the wage bill of incented firms. With such a modest cost compared to the wage bill, it is not surprising that a small percentage of the incented jobs resulting in new jobs for local residents can produce earnings gains for local residents from increased employment that are of similar magnitude to the original subsidy costs. Although the "batting average" of incentives is quite low, the economic impact of a net "hit" is so high that potentially the income benefits can exceed the costs.

2) These incentive costs and immediate earnings gains due to higher employment-to-population ratios are closely balanced. Any change in assumptions or policy choices or local context may significantly alter this balance. And this analysis so far omits other important effects on local earnings, such as how education cutbacks reduce local wages.

Job Effects by Year

Table 3 and Figure 1 go on to describe how the jobs created because of incentives evolve over time. I divide job effects into

- effects on the incented firms;
- multiplier effects;

68 The logic of job vacancy chains is discussed in Persky, Felsenstein, and Carlson (2004).

- negative effects on other private employment because of the higher wages and rents and other local costs brought about by higher local growth;
- negative "demand-side" effects on local jobs because of the net budget costs (after fiscal benefits) of incentives, leading to increased local taxes and cuts in local public spending, which will reduce jobs for both public workers and private workers;
- negative "supply-side" effects on private employment due to the higher costs brought about by the costs of financing incentives in part through higher business taxes;
- negative "supply-side" effects on local employment due to incentives being financed in part by cuts in K–12 spending, which will lead to wage cuts, which reduce demand for local goods and services.

The table and figure show net jobs, as of a certain year, in a world with the incentives, compared to a world without the incentives. The actual year-to-year job growth is the change in jobs from one year to the next. Thus, total job growth is 833 in Year One but then increases to 1,126 in Year Two (= Year Two total job creation of 1,959 minus 833 jobs created already in Year One). After Year Two, net job growth slows down. Job growth is only 302 jobs in Year Three (2,261 Year Three job creation total, minus 1,959 for Year Two). After Year Three, job growth in most years is negative because of numerous adjustments, which I describe below.

As can be seen in the table and figure, the direct effects on incented firms occur immediately, and they persist unchanged for 80 years. The multiplier effects also occur relatively quickly, adjusting 50 percent toward the long-term level every year. Total "direct" jobs created due to incented firms and their multiplier effects relatively quickly gets up to the figure's maximum jobs-created effect of 2,925 jobs.

However, these direct jobs created lead to many offsets, which reduce jobs. The net jobs that are created lead to increases in local wages, land prices, building rental and purchase costs, and other local costs. These increased local costs reduce the attractiveness of the local area to many private businesses, and this effect over time gradually reduces some local jobs. These negative cost effects peak at a destruction of 1,062 jobs in Year 25. However, because costs are permanently higher because of the incented jobs and the multiplier effects, these negative offsets from higher costs continue, producing negative effects of more than 900 jobs through Year 80.

The net costs of financing incentives, after any fiscal benefits, will lead to some combination of increased taxes and lower public spending. The lower public spending directly destroys some jobs. The higher taxes, and the lower spending power of public employees, will in turn destroy some jobs because of lower demand for local goods and services. Because incentives are significantly front-loaded in Year One, the Year One negative demand effects are particularly large. In that year, negative demand effects destroy 1,215 jobs, and this offsets 59 percent of the direct job creation in the incented firms and their multiplier effects (1,215 = 59 percent of 1,178 + 878). After Year One, these negative demand effects trend downward until Year 21, both because incentive costs in subsequent years are lower and because some fiscal benefits begin to occur. After Year 21, the negative demand effects begin to increase, eventually ending up at a long-term job destruction of a little over 180 jobs. This increase in negative demand effects occurs for two reasons. First,

Table 3 Employment Effects of Incentive by Year, Broken Down by Effects on Incented Jobs, Multiplier Jobs, and Other Jobs

Year	Total	Incented firms' employment effect	Net multiplier and displacement effect	Higher cost negative feedback	Demand-side effects of financing incentives	Supply-side effects of higher business taxes to finance incentives	Supply-side effects of financing incentives by lower K–12 spending
1	833	1,170	878	0	(1,215)	0	0
2	1,959	1,170	1,317	(46)	(392)	(89)	(0)
3	2,261	1,170	1,536	(170)	(164)	(110)	(1)
4	2,221	1,170	1,646	(324)	(157)	(112)	(2)
5	2,078	1,170	1,701	(464)	(212)	(113)	(3)
6	1,954	1,170	1,728	(578)	(243)	(119)	(5)
7	1,833	1,170	1,742	(666)	(280)	(126)	(7)
8	1,744	1,170	1,749	(733)	(297)	(135)	(10)
9	1,668	1,170	1,752	(783)	(312)	(145)	(14)
10	1,607	1,170	1,754	(821)	(323)	(154)	(18)
11	1,806	1,170	1,755	(848)	(83)	(164)	(23)
12	1,817	1,170	1,755	(883)	(41)	(156)	(29)
13	1,810	1,170	1,755	(919)	(16)	(145)	(35)
14	1,776	1,170	1,755	(950)	(24)	(133)	(42)
15	1,742	1,170	1,755	(976)	(35)	(123)	(50)
16	1,728	1,170	1,755	(995)	(31)	(114)	(58)
17	1,707	1,170	1,755	(1,011)	(36)	(106)	(66)
18	1,688	1,170	1,755	(1,023)	(41)	(99)	(74)
19	1,674	1,170	1,755	(1,032)	(44)	(93)	(82)
20	1,661	1,170	1,755	(1,039)	(47)	(88)	(90)
21	1,704	1,170	1,755	(1,044)	3	(84)	(97)
22	1,690	1,170	1,755	(1,051)	(4)	(76)	(105)
23	1,663	1,170	1,755	(1,057)	(24)	(69)	(112)
24	1,636	1,170	1,755	(1,061)	(45)	(65)	(119)
25	1,612	1,170	1,755	(1,062)	(64)	(62)	(125)
26	1,591	1,170	1,755	(1,061)	(81)	(61)	(131)
27	1,573	1,170	1,755	(1,059)	(96)	(62)	(137)
28	1,557	1,170	1,755	(1,055)	(109)	(63)	(142)
29	1,541	1,170	1,755	(1,050)	(122)	(66)	(147)
30	1,527	1,170	1,755	(1,045)	(135)	(69)	(151)
31	1,519	1,170	1,755	(1,039)	(140)	(72)	(155)
32	1,513	1,170	1,755	(1,033)	(145)	(76)	(159)
33	1,507	1,170	1,755	(1,028)	(148)	(80)	(163)
34	1,502	1,170	1,755	(1,023)	(152)	(84)	(166)
35	1,496	1,170	1,755	(1,018)	(156)	(87)	(169)
36	1,491	1,170	1,755	(1,013)	(159)	(91)	(172)
37	1,486	1,170	1,755	(1,008)	(163)	(94)	(175)
38	1,480	1,170	1,755	(1,004)	(166)	(98)	(177)
39	1,475	1,170	1,755	(1,000)	(170)	(101)	(180)
40	1,470	1,170	1,755	(996)	(174)	(104)	(182)
41	1,467	1,170	1,755	(992)	(175)	(108)	(184)
42	1,465	1,170	1,755	(988)	(176)	(111)	(186)
43	1,462	1,170	1,755	(985)	(177)	(114)	(188)
44	1,460	1,170	1,755	(982)	(177)	(116)	(190)
45	1,458	1,170	1,755	(979)	(178)	(119)	(192)
46	1,456	1,170	1,755	(976)	(179)	(121)	(194)
47	1,454	1,170	1,755	(973)	(180)	(124)	(195)

(continued)

Table 3 (continued)

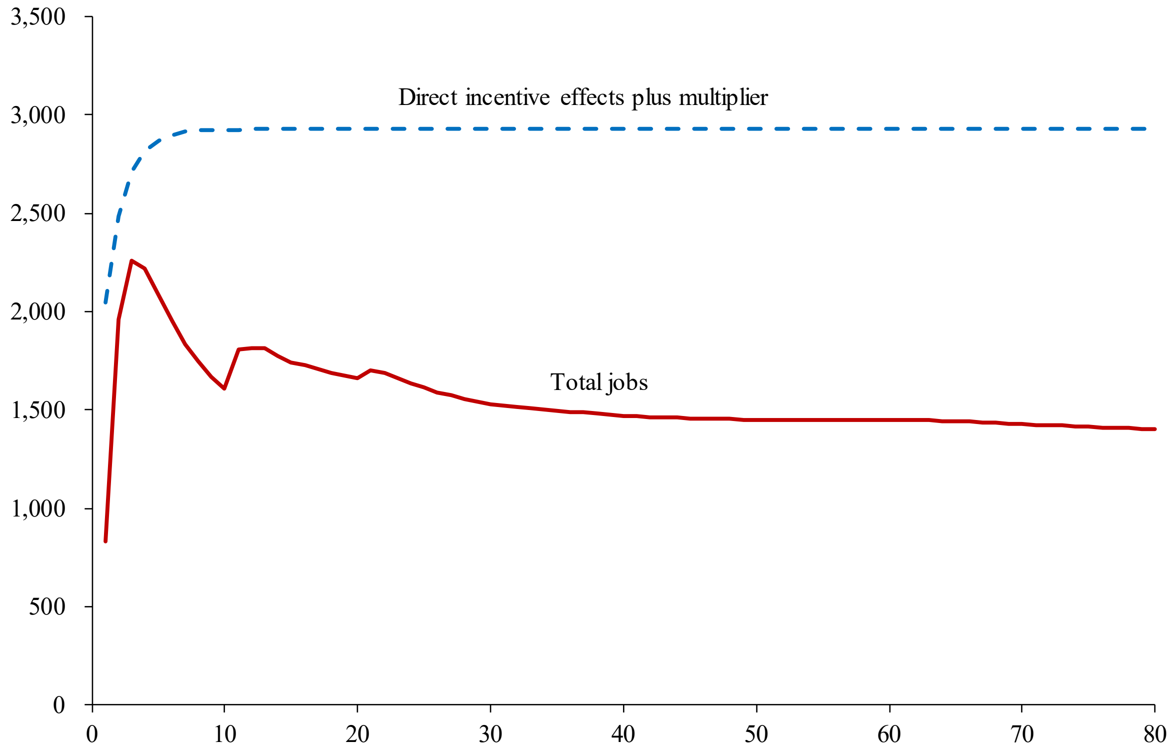
Year	Total	Incented firms' employment effect	Net multiplier and displacement effect	Higher cost negative feedback	Demand-side effects of financing incentives	Supply-side effects of higher business taxes to finance incentives	Supply-side effects of financing incentives by lower K–12 spending
48	1,452	1,170	1,755	(971)	(181)	(126)	(196)
49	1,451	1,170	1,755	(969)	(181)	(128)	(197)
50	1,450	1,170	1,755	(967)	(182)	(129)	(197)
51	1,450	1,170	1,755	(965)	(182)	(131)	(198)
52	1,449	1,170	1,755	(963)	(182)	(133)	(198)
53	1,449	1,170	1,755	(962)	(182)	(134)	(198)
54	1,449	1,170	1,755	(961)	(182)	(135)	(198)
55	1,450	1,170	1,755	(960)	(182)	(137)	(198)
56	1,450	1,170	1,755	(959)	(182)	(138)	(197)
57	1,450	1,170	1,755	(958)	(182)	(139)	(197)
58	1,450	1,170	1,755	(957)	(182)	(139)	(197)
59	1,450	1,170	1,755	(957)	(182)	(140)	(197)
60	1,449	1,170	1,755	(956)	(182)	(141)	(198)
61	1,448	1,170	1,755	(956)	(182)	(142)	(199)
62	1,447	1,170	1,755	(955)	(182)	(142)	(200)
63	1,446	1,170	1,755	(955)	(182)	(143)	(201)
64	1,444	1,170	1,755	(954)	(182)	(143)	(203)
65	1,442	1,170	1,755	(953)	(182)	(144)	(205)
66	1,439	1,170	1,755	(953)	(182)	(144)	(208)
67	1,437	1,170	1,755	(952)	(182)	(144)	(211)
68	1,434	1,170	1,755	(951)	(182)	(145)	(214)
69	1,431	1,170	1,755	(950)	(182)	(145)	(218)
70	1,428	1,170	1,755	(949)	(182)	(145)	(222)
71	1,426	1,170	1,755	(947)	(182)	(145)	(226)
72	1,423	1,170	1,755	(946)	(182)	(146)	(230)
73	1,420	1,170	1,755	(945)	(182)	(146)	(234)
74	1,417	1,170	1,755	(943)	(182)	(146)	(238)
75	1,414	1,170	1,755	(942)	(181)	(146)	(242)
76	1,412	1,170	1,755	(940)	(181)	(146)	(246)
77	1,410	1,170	1,755	(939)	(181)	(146)	(250)
78	1,407	1,170	1,755	(937)	(181)	(147)	(254)
79	1,405	1,170	1,755	(935)	(181)	(147)	(257)
80	1,404	1,170	1,755	(934)	(181)	(147)	(260)

NOTE: The numbers in this table are for jobs created due to an incentive of 1.24% of value-added that extends to 10,000 jobs in typical export-base firms. The effects are broken down in this table by incented jobs and multiplier jobs, and then by offsets due to higher local costs, demand effects of financing incentives, supply-side effects on business costs due to higher business taxes from financing incentives, and effects on local demand due to lower wages from education cutbacks resulting from financing incentives. Negative numbers are in parentheses.

future incentives to offset depreciation and encourage job retention begin to occur, which increases financing needs of incentives, although not to their original level in the first ten years. Second, as population adjusts to the increased number of jobs, fiscal benefits turn into fiscal costs, because the new population raises public spending needs.

The financing of the net budget costs of incentives also leads to increased business taxes, which will raise business costs and thereby reduce private employment. This effect begins to occur almost immediately but reflects some gradual negative adjustment at 9 percent per year to the higher busi-

Figure 1 Total Job Creation Due to Incentive, vs. Multiplier Effects



NOTE: This figure is derived from Table 3. "Direct incentive effects plus multiplier" sum the two columns in that table that show direct effects on incented firms plus input-output multiplier effects.

ness taxes. Business taxes' negative effects on jobs peak after 11 years at a loss of 164 jobs. After that, the business tax effect goes down until Year 26, due to somewhat lagged effects of the net budgetary costs of incentives going down. After Year 26, these negative effects of higher business taxes begin to go up again, as a somewhat lagged effect of net financing costs of incentives going up because of higher retention incentives and lower fiscal benefits.

The net budget costs of incentives lead to some cuts in K–12 spending. These cuts in K–12 spending, in addition to the negative effects on demand noted above, will reduce future wages in the economy. This is a "supply-side" effect in that it reduces wages by reducing the skills of the local labor supply. But this supply-side effect has some demand-side consequences. These lower future wages will reduce demand for local goods and services. This education supply-side effect on local demand is much delayed, because the largest effects of K–12 cuts on wages occur after multiple cohorts of K–12 students have experienced K–12 cutbacks, and after these cohorts have aged enough that they are close to their peak earnings years. The negative effects of education cutbacks on jobs initially peak at a destruction of around 198 jobs in Year 53. This job destruction through Year 53 is largely due to the financing costs of the initial 20 years of incentives, which affect the future earnings of the children in K–12 during those first twenty years. After Year 53, the job destruction from lower earnings due to lower K–12 spending slightly diminishes before beginning to increase again, ending up at job destruction of 260 jobs in Year 80. This renewed upward trend in job destruction from education spending reflects a much-lagged effect of the upward trend in financing costs of incentives after Year 20, as retention incentives increase and the long-run fiscal costs of incentives become more apparent.

Overall, total jobs created are substantial for the entire period, but are greatest early on. Total jobs created peaks at 2,261 jobs in Year Three. By that year, most of the multiplier effects have been realized, the initial negative demand-side effects of the hefty Year One incentives are no longer occurring, and most of the negative supply-side effects have not yet reached their full extent. It takes time for higher costs and higher business taxes to reduce other private jobs. It takes even more time for the lower earnings from lower education spending to reduce jobs. After Year Three, these negative supply-side effects become more important, and over time they reduce total jobs created. By Year 80, total jobs created is down to 1,404 jobs.

Summary over All Years of Various Types of Net Income Effects

Continuing to use the baseline assumptions, I now report summary measures of incentives' effects on various types of net income gains for local residents (Table 4). The focus is on the present value, discounted back to Year One at a 3 percent real discount rate, of the net income gains over the entire 80-year simulation.

The present value of direct incentive costs is partially offset by two other fiscal effects on state and local government budgets. First, there are some fiscal benefits, as tax revenue tends to go up with employment, spending needs tend to go up with population, and the labor demand shock brought about by incentives increases the employment-to-population ratio. However, this offset from fiscal benefits is moderate, because the effect on employment-to-population ratios is moderate. The fiscal benefit of $117.8 million offsets about 23 percent of incentive budget costs of $508.5 million.

This modest fiscal benefit does not reflect modest effects of incentives on state and local tax revenue: the simulation suggests that the incentive will lead to increases in state and local tax revenue of $1,404.5 million. But public spending needs are estimated to grow by a present value of $1,286.7 million. For every dollar of extra tax revenue, there is $0.92 in extra spending needs (92 percent = $1,286.7 million/$1,404.5 million). The net fiscal gain of $117.8 million reflects the extra revenue minus these spending needs ($117.8 million = $1,404.5 million minus $1,286.7 million).

Second, under the baseline method of financing, half of the financing comes from higher taxes, 44.1 percent of taxes come from business, and 74 percent of those businesses are not locally owned. Therefore, $63.8 million of the net incentive costs, after fiscal benefits, are exported to nonlocal business owners, who are excluded from the income gains and losses that are the focus of our simulation model, which is concerned with gains and losses for local residents.[69]

As a result, the net fiscal costs of incentives are significantly reduced from the official budget costs of incentives. Rather than costing $508.5 million, the net fiscal burden is $326.9 million. Due to both fiscal benefits and exporting to out-of-state business owners, net fiscal costs of incentives are lowered by 36 percent. (326.9/508.5 = 64 percent).

69 $63.8 million = (incentive budget cost of $508.5 million minus fiscal benefit of $117.8 million) times 50 percent tax share in financing times 44.1 percent business share in financing times 74 percent of business ownership out-of-state.

Table 4 Net Effects on Local Residents' Incomes from Incentives, Due to Various Avenues for Effects

Present value of incentive costs	(508.5)	
PV of fiscal benefits (= $1,404.5M revenue minus $1,286.7M public service costs)	117.8	
PV of exported business taxes	63.8	
Subtotal: Net PV of local residents' incentive costs (incentive costs + fiscal benefits + exported business taxes)		(326.9)
PV of net earnings (after taxes) due to higher employment-to-population ratios	421.5	
PV of net wage increases (after taxes) due to higher employment-to-population ratios	100.2	
Subtotal: PV of labor market benefits from higher net earnings (after taxes) for local residents		521.7
PV of net capital gains, after increased property taxes, due to increased property values, for local property owners		146.6
PV of net wage loss (net of lower taxes) due to education spending cutbacks		(193.9)
PV of lower net after-tax profits for locally owned businesses due to higher wages	(1.7)	
PV of lower net after-tax profits for locally owned businesses due to higher prices of local real estate and associated higher costs of other local inputs	(32.2)	
Subtotal: PV of total effect on net after-tax profits for locally owned businesses		(33.9)
Net local income effects summing all effect types (e.g., summing all numbers in rightmost column)		113.6
"Benefit-cost ratio": (Net benefits plus incentive costs) / (incentive costs)		1.223

NOTE: All dollar figures are in millions of present-value 2015 dollars. Negative numbers such as net costs or losses are indicated by parentheses. This table calculates net income effects from different sources for local residents from the baseline incentive package for 10,000 jobs. To avoid double-counting, the increased taxes on local residents' income gains are subtracted from these income gain types, but are reflected in fiscal benefits.

However, economic development agencies often claim that incentives will provide state and local governments with a net fiscal gain, after accounting for fiscal benefits. This claim is not close to being true in this baseline model. Analyses that make such a claim sometimes ignore the effects of increased growth on spending needs. In this model's baseline analysis, if we ignored increased spending needs, the revenue from growth would be more than double incentives' official budget costs ($1,404.5 million is the increased revenue, versus $508.5 million in incentive costs). But the costs of increased population for public spending needs are real costs. If public spending on schools is not increased to match the increased number of students, or public spending on roads is not increased to match the increased number of commuters, then the real quality of public services in the state will deteriorate, which is already a real cost. State and local governments cannot really avoid these increased costs from a higher population; they can only choose whether these costs should be realized in the form of reduced public service quality, or in higher public spending for the same public service quality.

In other cases, analyses that claim that fiscal benefits exceed incentive costs are assuming greater effects of incentives on growth—for example, due to greater responsiveness of incented firms to incentives, or higher multipliers, or other factors. Later in the report, we will see some scenarios under which incentives have sufficiently great job effects that they pay for themselves.

For local workers, we already mentioned that the increased employment-to-population ratios increase net local earnings after taxes by $421.5 million. In addition, these higher employment-to-population ratios, by tightening local labor markets, lead to higher real wages. These higher real wage effects are assumed in the model to depreciate over time, so they are modest at only $100.2 million.

Overall, labor market benefits add up to $521.7 million. Labor market benefits are 4.4 times fiscal benefits of $117.8 million. Economic development incentives should be thought of as a labor market policy that seeks to increase workers' earnings by improving the demand side of the local labor market. Economic development incentives should not be thought of as primarily a way for the government to make money.

The higher employment and population will also drive up property values. The net present value of this property-value increase in the model is $146.6 million. This amount is net of property tax increases on these higher property values.

Property value increases are not larger in the model for two reasons. First, some of these property value increases, particularly on business property, accrue to nonlocal owners of property, and these gains to nonlocal residents are not counted in this model.[70] Second, and this is a bigger factor, property-value capital gains are a one-time income gain in the model. In contrast, the labor market gains due to higher employment-to-population ratios are persistent gains for the entire 80 years of the simulation.[71]

A major factor in the baseline scenario that affects incomes is financing incentives by cutting back on productive education spending. The baseline model assumes that half the incentive financing, net of fiscal benefits, comes from cutting public spending, and that 22.1 percent of reduced spending is taken out of K–12. These education cutbacks are estimated to reduce the present value of future earnings by reducing real wages of local residents. I only count the wage reduction for local residents who end up staying in the local area. Still, these local earnings losses from education cutbacks total in present value $193.9 million.

What is remarkable is that even in this baseline model, with only 11 percent of the fiscal costs of incentives being taken out of K–12 education, the opportunity costs due to this reduced education funding, at $193.9 million, are 59 percent of the net fiscal costs of incentives, at $326.9 million. Policymakers often focus on the budget costs of public policies, but as this example shows, the economic costs of foregone opportunities can also be quite large. Later in this report, we will see that these opportunity costs of reduced education spending will be even larger when a greater share of incentives are financed by lower education spending.

Finally, the higher local wage costs and higher local costs of real estate and other local inputs reduce the profits of locally owned businesses by $33.9 million in present value. These reduced profits are modest in part because any lost profits of nonlocally owned businesses are not counted in the model.[72] In addition, the model assumes that local prices adjust to offset higher costs for

70 As discussed in Appendix C, I assume that owner-occupied housing is all owned by local residents but that nonlocal residents own 90 percent of real estate owned by nonfinancial corporate businesses and 50 percent of real estate owned by nonfinancial, noncorporate businesses.

71 Simplified models of local economies would argue that all effects of incentives should be capitalized into property values. This is not true in the baseline scenario, nor for any realistic scenario. Housing and other real estate supply expands sufficiently to restrain real estate capital gains. In addition, labor is sufficiently imperfectly mobile that labor market effects are large. In Appendix E, I explore trying to get the model to find effects dominated by property capitalization, and I find that this is very hard to do without employing quite artificial assumptions about the workings of local labor and housing markets.

72 Because 74 percent of business profits are assumed to go to out-of-state owners, a national perspective would considerably increase the business costs of higher local wages and prices. Of course, adopting a fully national perspective would also entail many other modifications—for example, considering the losses to other states from attracting the facility to this state.

locally owned businesses that are not export-based. Therefore, the $33.9 million in reduced profits from higher costs only reflects losses from locally owned export-base businesses.

Netting all these effects, for all types of income gains and losses for local residents, this report comes up with the following bottom line: the incentive package, on net, increases the present value of local incomes by $113.6 million. Overall, these net benefits are only modest compared to the size of the incentive policy. For example, the "benefit-cost ratio," in which we compare gross benefits (which equals net benefits plus incentive budget costs) to incentive budget costs, is only 1.223—that is, gross benefits only exceed incentive costs by 22.3 percent.[73]

Furthermore, it is obvious that this relatively modest net effect reflects different effects on different types of income that are nearly offsetting. These different effects on different income types can vary a lot with policy, which will be explored later.

Net Income Effects by Year

I now turn to describing net income effects by year. Table 5 and Figure 2 describe the time pattern of selected income effects on local residents by year over the 80-year period after the incentives are provided in Year One.

Even though the incentive costs are heaviest in Year One, Year One still has net benefits that are positive. These include considerable labor market benefits and capital gains from property values increasing. And in Year One, the negative side effects from increased costs and incentive financing are modest, mainly consisting of some demand effects reducing net job growth.

In Year Two, annual net benefits reach their peak, at $170.6 million. Capital gains on property values also reach their peak, because net job growth peaks in Year Two. (See Table 3: net job creation peaks at 1,116 jobs, which equals the 1,959 jobs in Year Two minus the 833 jobs in Year One.) Net job growth peaks in Year Two because the negative demand effects from the heavy incentives in Year One are considerably reduced as we move to the lower incentives level of Year Two. Labor market benefits in Year Two are also larger because of the high net job growth. In addition, Year Two has lower incentive costs. Finally, as of Year Two, few other cost or incentive financing offsets are of much significance.

Years 3 and 4 still have considerable net benefits from incentives. Incentive costs continue to go down because of the front-loading of the incentive package. Property value effects are down because net job creation is down, but labor market benefits of the net job growth are far more persistent.

From Year Five through Year 22, net benefits of incentives fluctuate around a relatively low level. Incentive costs generally decline. But so do labor market benefits. With jobs created relatively constant, the effects on the employment-to-population ratio, and on real wages, depreciate over time.

Starting in Year 23, annual net benefits turn negative. Thereafter, net benefits become increasingly negative, with annual negative benefits increasing to minus $49.1 million by Year 80. Net bud-

73 1.223 = (incentive budget costs of $508.5 million plus net benefits of $113.6 million) divided by incentive budget costs of $508.5 million.

get costs also turn increasingly negative, due to some increased incentive costs from incentives paid to ensure job retention, and due to fiscal benefits turning into fiscal costs as population in-migration catches up with employment. Labor market benefits are reduced and then turn negative as job growth becomes negative, because of cost increases and the effects of reduced earnings from K–12 education cutbacks. Even more important are the direct effects of education cutbacks in reducing earnings, which become much more negative over time as the cohorts affected by education cutbacks begin entering their prime earnings years.

Table 5 Time Path of Major Income Effects

Year	Net local budget costs	Total local labor market benefits	Net property cash flow	Net education cutback cash flow	Effects on local business costs	Total net benefit by year	Cumulative present value
1	(52.5)	38.4	76.9	0.0	(0.5)	62.3	62.3
2	(17.2)	83.7	105.3	(0.0)	(1.2)	170.6	227.9
3	(7.3)	83.3	28.6	(0.0)	(1.4)	103.2	325.1
4	(7.1)	67.9	(3.8)	(0.1)	(1.4)	55.6	376.0
5	(9.6)	51.2	(13.7)	(0.1)	(1.2)	26.5	399.6
6	(11.2)	38.6	(12.1)	(0.2)	(1.1)	14.0	411.7
7	(13.0)	28.5	(11.9)	(0.3)	(1.0)	2.3	413.6
8	(13.9)	21.8	(8.9)	(0.4)	(1.0)	(2.4)	411.7
9	(14.8)	16.8	(7.6)	(0.6)	(0.9)	(7.1)	406.0
10	(15.6)	13.3	(6.2)	(0.8)	(0.9)	(10.2)	398.3
11	(4.0)	22.9	20.7	(1.0)	(1.0)	37.6	426.2
12	(2.0)	21.6	1.3	(1.2)	(1.0)	18.6	439.7
13	(0.8)	19.6	(0.6)	(1.5)	(1.0)	15.6	450.6
14	(1.2)	16.5	(3.6)	(1.9)	(1.0)	8.9	456.6
15	(1.8)	13.9	(3.6)	(2.2)	(1.0)	5.3	460.1
16	(1.6)	12.7	(1.6)	(2.6)	(1.0)	6.0	464.0
17	(1.9)	11.3	(2.2)	(3.0)	(1.0)	3.3	466.0
18	(2.2)	10.2	(2.0)	(3.4)	(1.0)	1.6	467.0
19	(2.4)	9.3	(1.6)	(3.8)	(1.0)	0.6	467.4
20	(2.6)	8.6	(1.4)	(4.2)	(1.0)	(0.6)	467.0
21	0.2	10.9	5.1	(4.6)	(1.0)	10.5	472.8
22	(0.2)	9.7	(1.5)	(5.1)	(1.0)	1.8	473.8
23	(1.3)	7.9	(3.1)	(5.5)	(1.0)	(3.0)	472.2
24	(2.5)	6.3	(3.2)	(5.9)	(1.0)	(6.2)	469.1
25	(3.7)	5.1	(2.9)	(6.3)	(1.0)	(8.7)	464.8
26	(4.7)	4.2	(2.5)	(6.6)	(1.0)	(10.6)	459.7
27	(5.6)	3.4	(2.2)	(7.0)	(1.0)	(12.4)	454.0
28	(6.5)	2.8	(2.0)	(7.3)	(1.0)	(14.1)	447.6
29	(7.4)	2.3	(1.9)	(7.7)	(1.0)	(15.7)	440.8
30	(8.2)	1.7	(1.8)	(8.0)	(1.0)	(17.3)	433.4
31	(8.7)	1.6	(0.9)	(8.3)	(1.0)	(17.3)	426.3
32	(9.1)	1.5	(0.8)	(8.6)	(1.0)	(17.9)	419.2
33	(9.4)	1.4	(0.6)	(8.9)	(1.0)	(18.5)	411.9
34	(9.7)	1.3	(0.7)	(9.2)	(1.0)	(19.4)	404.6
35	(10.1)	1.0	(0.7)	(9.5)	(1.0)	(20.3)	397.2
36	(10.4)	0.8	(0.7)	(9.8)	(1.0)	(21.1)	389.7
37	(10.8)	0.5	(0.7)	(10.1)	(1.0)	(22.1)	382.1
38	(11.2)	0.2	(0.7)	(10.4)	(1.0)	(23.0)	374.4
39	(11.6)	(0.1)	(0.7)	(10.6)	(1.1)	(24.0)	366.6

(continued)

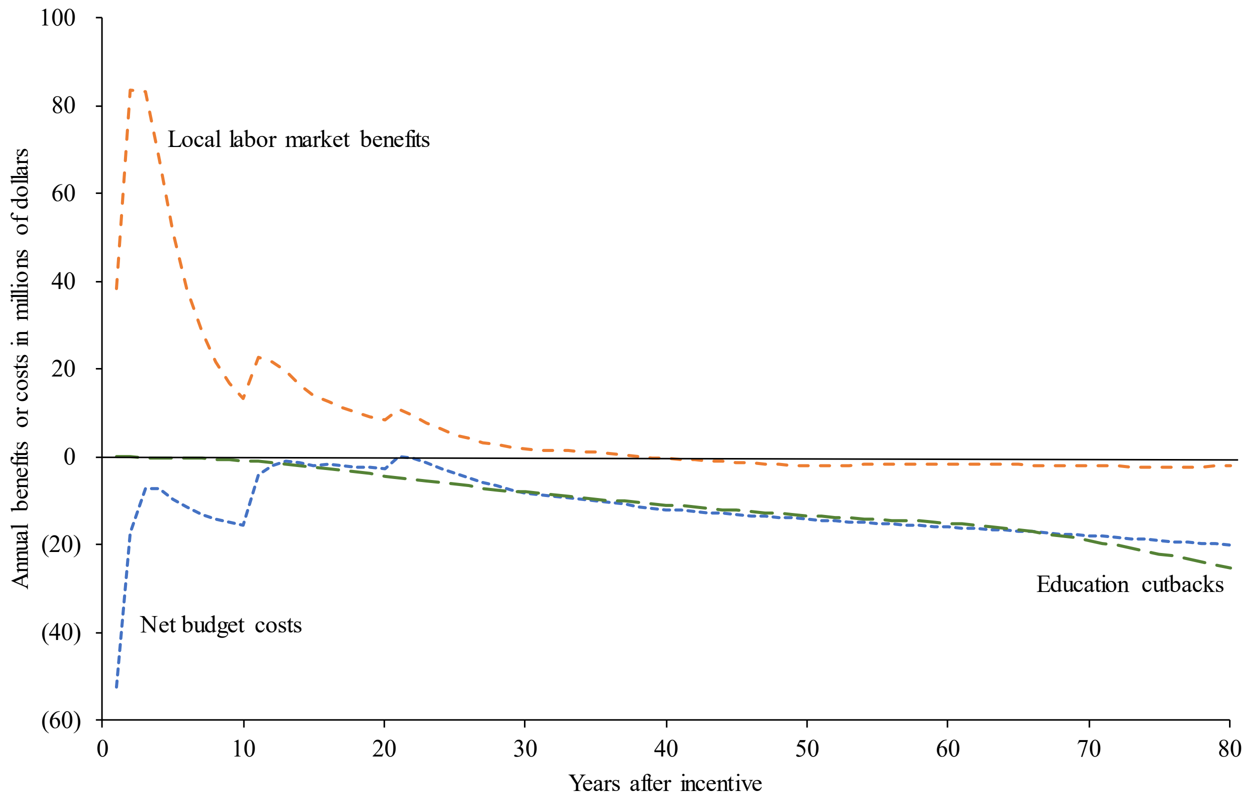
Table 5 (continued)

Year	Net local budget costs	Total local labor market benefits	Net property cash flow	Net education cutback cash flow	Effects on local business costs	Total net benefit by year	Cumulative present value
40	(11.9)	(0.4)	(0.7)	(10.9)	(1.1)	(24.9)	358.7
41	(12.2)	(0.5)	(0.3)	(11.1)	(1.1)	(25.2)	351.0
42	(12.4)	(0.6)	(0.3)	(11.4)	(1.1)	(25.8)	343.3
43	(12.6)	(0.8)	(0.3)	(11.7)	(1.1)	(26.4)	335.7
44	(12.8)	(1.0)	(0.3)	(11.9)	(1.1)	(27.1)	328.1
45	(13.0)	(1.2)	(0.3)	(12.2)	(1.1)	(27.8)	320.5
46	(13.2)	(1.4)	(0.2)	(12.4)	(1.1)	(28.4)	313.0
47	(13.5)	(1.6)	(0.2)	(12.7)	(1.2)	(29.0)	305.5
48	(13.7)	(1.7)	(0.1)	(12.9)	(1.2)	(29.6)	298.2
49	(13.9)	(1.8)	(0.1)	(13.1)	(1.2)	(30.0)	290.9
50	(14.1)	(1.8)	(0.0)	(13.3)	(1.2)	(30.4)	283.7
51	(14.3)	(1.8)	0.0	(13.5)	(1.2)	(30.8)	276.7
52	(14.5)	(1.8)	0.0	(13.7)	(1.2)	(31.2)	269.8
53	(14.7)	(1.8)	0.1	(13.8)	(1.2)	(31.4)	263.0
54	(14.8)	(1.8)	0.1	(14.0)	(1.3)	(31.7)	256.4
55	(15.0)	(1.7)	0.2	(14.1)	(1.3)	(32.0)	249.9
56	(15.2)	(1.6)	0.2	(14.3)	(1.3)	(32.2)	243.6
57	(15.3)	(1.6)	0.1	(14.4)	(1.3)	(32.6)	237.4
58	(15.5)	(1.6)	0.1	(14.6)	(1.3)	(32.9)	231.3
59	(15.7)	(1.6)	0.1	(14.8)	(1.3)	(33.3)	225.3
60	(15.9)	(1.6)	0.0	(15.0)	(1.4)	(33.8)	219.4
61	(16.1)	(1.6)	(0.1)	(15.3)	(1.4)	(34.3)	213.5
62	(16.3)	(1.6)	(0.1)	(15.5)	(1.4)	(34.9)	207.8
63	(16.5)	(1.7)	(0.2)	(15.8)	(1.4)	(35.5)	202.1
64	(16.6)	(1.7)	(0.2)	(16.2)	(1.4)	(36.2)	196.5
65	(16.9)	(1.8)	(0.3)	(16.6)	(1.4)	(36.9)	190.9
66	(17.1)	(1.8)	(0.3)	(17.0)	(1.4)	(37.6)	185.4
67	(17.3)	(1.9)	(0.4)	(17.4)	(1.5)	(38.4)	180.0
68	(17.5)	(1.9)	(0.4)	(17.9)	(1.5)	(39.2)	174.6
69	(17.7)	(2.0)	(0.5)	(18.4)	(1.5)	(40.0)	169.2
70	(17.9)	(2.0)	(0.5)	(19.0)	(1.5)	(40.8)	163.9
71	(18.1)	(2.1)	(0.5)	(19.5)	(1.5)	(41.7)	158.6
72	(18.3)	(2.1)	(0.5)	(20.1)	(1.5)	(42.6)	153.4
73	(18.5)	(2.1)	(0.5)	(20.7)	(1.5)	(43.4)	148.2
74	(18.7)	(2.2)	(0.5)	(21.3)	(1.6)	(44.3)	143.1
75	(19.0)	(2.2)	(0.5)	(22.0)	(1.6)	(45.1)	138.0
76	(19.2)	(2.2)	(0.4)	(22.6)	(1.6)	(45.9)	133.0
77	(19.4)	(2.2)	(0.4)	(23.2)	(1.6)	(46.8)	128.1
78	(19.6)	(2.1)	(0.4)	(23.9)	(1.6)	(47.6)	123.2
79	(19.8)	(2.1)	(0.3)	(24.5)	(1.6)	(48.4)	118.4
80	(20.1)	(2.0)	(0.3)	(25.1)	(1.7)	(49.1)	113.6

NOTE: All dollar figures are in millions of 2015 dollars. Negative numbers are indicated by parentheses.

The implication of this time path is that unlike many public investments, economic development policies are not a case of heavy investment costs up front, followed by later benefits. Rather, economic development policies provide immediate net benefits, which peak in Year Two. Over the long term, these immediate benefits are offset to a considerable extent by long-term costs. These long-term costs are due to the labor market benefits and property value benefits dissipating,

Figure 2 Time Pattern of Selected Income Effects on Local Residents by Year over the 80-Year Period After the Incentives are Provided in Year One



NOTE: This figure is derived from columns in Table 5. All dollar benefits and costs are in millions of 2015 dollars, undiscounted. Negative numbers are in parentheses. Years are since location decision was made.

whereas net budget costs and net costs of educational cutbacks become increasingly prominent over time. In this baseline scenario, economic development incentives are short-term gain, long-term pain.[74]

The time pattern revealed by Table 5 suggests that to truly evaluate economic development incentives requires a very long-term perspective. As of Year 20, for example, the cumulative present value of net benefits is $467 million, which is over four times net benefits as of Year 80, of $113.6 million. The big issue here is that incentives' long-term costs, due to educational cutbacks and long-term fiscal costs, are not apparent until after Year 20.

Net Income Effects by Income Quintile

So far, the numbers presented have been overall numbers for the entire population: workers of vastly different wages and employment experiences, local business owners, and local property owners are all lumped together into one aggregate local dollar effect on a given type of income.

74 Because of this time pattern of incentive costs versus benefits, it makes no sense to calculate a rate of return to economic development incentives. As the policymakers' discount rate increases, net benefits of incentives tend to go up, because the long-term costs become irrelevant and the short-term benefits become more prominent.

Table 6 moves on to allocating these different income types, and overall income changes in local income, by different local income quintiles. The quintiles go from the lowest income quintile, Quintile 1, which in aggregate before the incentives is expected to receive 5.08 percent of all income, up to the highest income quintile, Quintile 5, which before the incentives receives 51.96 percent of all income. The procedures for allocating different income types by income quintile are given above.

In describing the effects of some particular policy on some type of income for some group, I will often describe the effect as "progressive" or "regressive." "Progressive" effects tend to make overall income more equal, whereas "regressive" effects make overall income less equal. "Progressive" effects will occur if the extra income provided to lower-income groups tend to be greater as a *percentage* of the group's income, even if these effects are less in dollar terms; regressive effects occur if the income provided to lower-income groups is less in percentage terms. To make this judgment about progressivity or regressivity, I frequently will compare the percentage distribution of some extra income, either overall or of some type, across income quintiles, with the baseline distribution of overall income across quintiles. For example, suppose, due to some incentive policy, that some income type has an overall increase, with 10 percent going to the lowest income quintile and 30 percent to the upper income quintile. This income type's distribution will tend to equalize the income distribution, as the baseline income share of the lowest income quintile is only 5.08 percent, and the baseline income share of the highest income quintile is 51.96 percent. Thus, this extra income makes the income distribution more equal, in that the share of the lowest income quintile relative to that of the highest income quintile will increase. This is so even though the dollar income gains for the highest income quintile are three times the dollar income gains of the lowest income quintile. On the other hand, suppose some type of income effect is a net cost, with 10 percent of that increased cost going to the lowest income quintile and 30 percent to the highest income quintile. That net cost will tend to reduce the equality of net income, as income of the lowest income quintile will go down in percentage terms more than that of the highest income quintile.

The net effect on any income quintile is the sum of the effects on that income quintile of changes in different income types. This net effect depends on both the sign and the size of changes in different income types, and the incidence across income quintiles of changes in these income types. The negative income effects of budget costs are distributed moderately regressively by income quintile, with greater effects on lower income quintiles. Positive labor market benefits are distributed moderately progressively by income quintile, with particularly strong benefits for the bottom three income quintiles relative to the top two income quintiles. The benefits from increased property values are distributed highly regressively by income quintile, with most of these benefits going to the top income quintile. The costs of lost wages due to cutbacks in education spending are distributed highly regressively by income quintile, as the dollar loss is similar across different income quintiles of highly varying incomes. The costs of higher local business costs have strongly progressive effects on the income distribution, as most of these costs are borne by local business owners in the top income quintile. However, these costs are slight compared to other effects of incentives on local incomes. The distributional analysis is dominated by the relative distribution of budget cost, labor market benefits, property value gains, and education cutbacks.

The most striking conclusion from Table 6 is that even though overall local net incomes are up in these baseline simulations by $113.6 million, two of the income quintiles lose: Quintile 1, the lowest income quintile, and Quintile 4, the next-to-highest income quintile. Why does this occur?

Table 6 Effects of Incentives on Net Income of Different Income Quintiles, with Analysis of Division by Type of Income Effect

Panel A: Income effects in millions of dollars

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Income effects for each quintile as % of total income effect for all quintiles for that income type

		Quintile				
	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	100.00	(13.85)	10.27	49.94	(10.60)	64.24
Net local budget costs	100.00	10.64	12.49	15.33	19.19	42.34
Labor market benefits	100.00	11.72	17.05	26.03	13.42	31.79
Property-value benefits	100.00	3.16	4.84	6.56	11.80	73.65
Education cutbacks	100.00	23.72	22.05	19.27	17.75	17.22
Local business effects	100.00	2.12	2.26	3.50	6.46	85.65

NOTE: This table takes the changes in net income of different types and allocates these changes by income quintile, based on the assumptions about appropriate quintile allocators that are described in the paper's text. All dollar figures are present-value in millions of 2015 dollars. Quintiles are listed from lowest income (Quintile 1) to highest income (Quintile 5). The quintile income shares given come from CBO (2016) and are shares of after-transfer, before-tax income. Numbers in parentheses are negative numbers—that is, they represent costs for the relevant group for that income category. Total net for each income quintile, and overall, sums up the categories of income type listed in the rows below for that column. In Panel A, for each type of income effect in the row headings, the dollar amounts of the five quintiles sum to the total at left. Panel B shows each quintile's receipt of each source of net income as a percentage of the total received by all income quintiles for that income type. Quintile entries in each row sum to 100 percent.

The biggest loser is Quintile 1, the lowest income quintile. Quintile 1's net economic benefits are minus $15.7 million, and they are minus 13.85 percent of overall net benefits. The big losses of Quintile 1 are mainly attributable to this group suffering very large losses, in both absolute and proportionate terms, from education cutbacks. Quintile 1 loses the most of any quintile from education cutbacks—a loss of $46.0 million. This education cutback loss is 23.72 percent of overall education cutback losses, even though the income share of the lowest income quintile is only 5.08 percent. Thus, the cutback loss is a much-larger-than-average share of this quintile's income. Quintile 1 also loses because it bears more than its share of incentives' net budget costs: Quintile 1 pays 10.64 percent of net budget costs of incentives, over twice its baseline income share. Quintile 1 also gains disproportionately from labor market benefits, getting 11.72 percent of labor market benefits. However, these labor market benefits of $61.1 million are not enough to offset the $34.8 million in budget costs plus the $46.0 million in losses from educational cutbacks. Property-value gains and business-profit losses play little role for this lower income quintile.

Quintile 4, the second-highest income quintile, also loses in the baseline scenario, but for different reasons than the lowest income Quintile 1. Quintile 4 loses in part because its labor market benefits are modest compared to its income. Quintile 4 gets labor market benefits that are 13.42 percent of total labor market benefits—a third below this quintile's baseline income share of 20.00 percent.

These relative benefits are considerably below those of the middle-income quintile, which gets 26.03 percent of total labor market benefits, or nearly twice that of its baseline income share of 13.72 percent. In addition, Quintile 4, despite being relatively high-income, only gets a modest share of property-value gains. Quintile 4 gets 11.80 percent of total property-value gains, considerably below this quintile's baseline income share of 20.00 percent. This property-value income share is far below the property-value share of the top income quintile, Quintile 5, which gets 73.65 percent of property-value gains compared to its baseline income share of 51.96 percent. In sum, Quintile 4 falls between the cracks. Its income is high enough that, based on the research literature, it doesn't gain much from job growth tightening up local labor markets and raising employment-to-population ratios. But Quintile 4's income is low enough that it doesn't gain disproportionately from capital gains from local job growth's effects on property-value gains.

The bigger relative gainer quintile in the baseline scenario is Quintile 3, the middle-income quintile. Quintile 3 gains $56.7 million, which is 49.94 percent of overall net income gains, over three times this group's baseline income share of 13.72 percent. Quintile 3 gains disproportionately from labor market benefits. Quintile 3's labor market benefits out of total labor market benefits are 26.03 percent, almost twice this group's baseline income share of 13.72 percent. This middle-income quintile's relative gains from labor market benefits are almost as great at the lowest-income quintile, which receives 11.72 percent of benefits compared to its baseline income share of 5.08 percent. This middle-income quintile also pays more than its share of net budget costs and bears more than its share of education cutbacks, but Quintile 3's relative share of these costs is not as disproportionate as for the lowest income quintile.

Quintile 5 (the highest income quintile), and Quintile 2 (the second-lowest quintile) both gain slightly more than their initial income share. Quintile 5 gets 64.24 percent of total net benefits, well above this quintile's baseline income share of 51.96 percent. Why does this occur? First, this upper-income quintile gets far more than its share of property value benefits (73.65 percent). Second, the upper-income quintile pays less than its share of incentive budget costs (42.34 percent) and education cutback costs (17.22 percent). These factors outweigh the consideration that Quintile 5 also gains less than its share of labor market benefits.

Quintile 2 gets 10.27 percent of net overall benefits, slightly greater than this quintile's baseline income share of 9.24 percent. This second-lowest-income quintile gets more than its share of labor market benefits, at 17.05 percent. Although Quintile 2 also pays more than its share of budget costs and education cutbacks, these relative shares are not as extreme as for the lowest income quintile.

The bottom line is that once one accounts for the financing of economic development incentives, it is no longer the case that such incentives necessarily have clearly progressive effects throughout the income distribution. The overall effect on the income distribution is complex, but even if incentives are only partially financed through cutbacks in productive and egalitarian services such as K–12 education, the negative effects on the lowest income quintile are noteworthy. Economic development may provide a big boost to middle income groups, but its benefits for the lowest income quintile are more questionable. Finally, a lot of the benefits go to the highest income quintile.

ALTERNATIVE SCENARIOS, GROUP 1: ALTERNATIVES VARYING IN THE NUMBER AND QUALITY OF JOBS CREATED IN RESPONSE TO A GIVEN REDUCTION IN INCENTED FIRMS' COSTS

I now consider model simulations under alternative scenarios. These alternative scenarios differ from the baseline scenario in one or more assumptions. Most of these assumptions can be altered by policy. Therefore, these alternative scenarios, compared to the baseline scenario, can inform policymakers as to what policy choices might increase incentives' net benefits, and what policies might increase benefits for low-income groups.

For these comparisons, I generally report the alternative scenario's simulation of the overall impacts on different types of income and different income quintiles, and compare this to the baseline scenario. In other words, I calculate an alternative version of Table 6 under the alternative scenario's assumptions and compare these results with the original Table 6.

This comparison helps clarify what is the impact of just changing one or two assumptions, compared to the baseline. Obviously, in the real world, sometimes a particular incentive policy in a particular local area may involve changes in many assumptions at the same time. Evan this lengthy report does not have the space to fully consider all possible combinations of assumptions, but this is possible using the underlying model. However, in some cases in the below discussion, when analyzing some particular alternative, there are some estimates reported in the text or footnotes that describe the tradeoffs between making different assumption changes. For example, sometimes an assumption is changed, and the text or footnotes reports what change in some other assumption would be needed to make net benefits equal to zero.

For convenience, these alternative scenarios are put into various groups. The first group, discussed in this section, is made up of alternatives that affect, for a given change in incented firms' costs due to incentives, the quantity and quality of jobs created in response in the local economy. The second group, in the next section, consists of alternatives involving changes in the design or financing of incentives. The third group comprises alternatives that change whether local nonemployed residents gets the jobs created. The baseline and these first three groups of alternatives assume the incented firms have out-of-state owners. The final group of alternatives considers the implications of local ownership of incented firms under various assumptions.

In the first group of alternative scenarios, I consider the following changes in assumptions that alter the quantity and quality of jobs created, in response to a given change in incented firms' costs:

- Different assumptions about the cost sensitivity of location decisions of incented firms
- Different assumptions about the multiplier effects of job creation in incented firms
- Different assumptions about the percentage of incented firms' business activity that is "export-base"
- Different assumptions about the wage premia paid by incented firms, and about wage premia's local economic effects

Incented Firms' Responsiveness to Costs

In Table 7, I consider how incentives' effects on income of various types for different income groups vary with different assumed sensitivity of incented firms and other firms to changes in costs.

The baseline scenario assumed a cost sensitivity of −10, in which an incentive that reduces the present value of costs by 1 percent of value-added would increase the probability of location by 10 percent. As previously discussed, this is consistent with a −0.5 long-run elasticity of state and local business activity with respect to state and local business taxes. Such an elasticity fits the research evidence for studies that estimate the effects of state and local business taxes, holding constant the quality of state and local public services.

However, other elasticities are possible. There is some uncertainty in the research literature. My prior analysis of the research literature (Bartik 1992) suggested that the overall business tax elasticity, holding public services constant, might plausibly be in the range of −0.15 to −0.85. Elasticities of −0.15 and −0.85 would imply overall cost sensitivities of −3 and −17 (that is, 70 percent lower in absolute magnitude than the baseline sensitivity, and 70 percent greater than the baseline sensitivity in absolute magnitude).

We would expect that any extra cost sensitivity of incented businesses would increase net benefits, although with some reduction because the model assumes that with increased cost sensitivity, other private sector jobs will respond more negatively to the increased costs brought about by incentives.

As mentioned above, in the model of how businesses respond to incentives, a cost sensitivity of −10 implies that this incentive package of 1.24 percent will tip the location or expansion decisions of 11.70 percent of all firms receiving incentives. If the cost sensitivity is increased (in absolute value) to −17, this same incentive package of 1.24 percent would be estimated to tip location or expansion decisions for 19.07 percent of all firms receiving incentives. On the other hand, if the cost sensitivity is reduced (in absolute value) to −3, this baseline incentive package of 1.24 percent would only tip the location or expansion decisions for 3.67 percent of all firms receiving incentives.[75]

As Table 7 shows, different cost sensitivity of businesses indeed makes a big difference. If the cost sensitivity is cut from −10 to −3, all groups suffer net losses from the incentive package.[76] The major reason for this change is that labor market benefits are much lower when fewer new location decisions are induced, which in turn reduces multiplier effects on other jobs, and overall job creation. Other numbers also change: because of less job creation, property-value gains are lessened. And because of less job creation, the employment-to-population ratio doesn't go up as much, resulting in lower fiscal benefits. The lower fiscal benefits not only mean that there is an increase in net budget costs, but they also lead to bigger cutbacks in education spending. Lower education spending further reduces benefits by leading to lower skills, and therefore lower wages later, for the cohorts of former K–12 students adversely affected by the education cutbacks.

---

75 The "but for" or "tipping" percentage is not a simple multiple of the cost sensitivity parameter, because this is derived from a model that assumes a constant elasticity of response to costs. As shown in Appendix D, this results in a model in which the percentage of incented businesses that are tipped equals 1 minus the quantity (1− incentive package percentage) raised to (minus the cost sensitivity parameter).

76 Net benefits go from negative to positive, as we move from a −8.2 cost sensitivity to a −8.3 cost sensitivity.

Table 7 Effects of Alternative Sensitivity of Business Location to Business Costs

Panel A: Baseline, cost sensitivity of −10: 1% lower cost as % of value-added causes 10% increase in business locations and 10% increase in long-run employment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Cost sensitivity of −3: 1% lower cost as % of value-added causes 3% increase in business locations and 3% increase in long-run employment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(487.7)	(85.8)	(81.1)	(72.5)	(99.6)	(148.8)
Net local budget costs	(400.4)	(42.6)	(50.0)	(61.4)	(76.9)	(169.5)
Labor market benefits	136.8	16.0	23.3	35.6	18.3	43.5
Property-value benefits	39.2	1.2	1.9	2.6	4.6	28.8
Education cutbacks	(254.1)	(60.3)	(56.0)	(49.0)	(45.1)	(43.8)
Local business effects	(9.1)	(0.2)	(0.2)	(0.3)	(0.6)	(7.8)

Panel C: Cost sensitivity of −17: 1% lower cost as % of value-added causes 17% increase in business locations and 17% increase in long-run employment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	419.8	20.1	59.0	122.6	32.6	185.6
Net local budget costs	(288.7)	(30.7)	(36.1)	(44.3)	(55.4)	(122.2)
Labor market benefits	717.3	84.0	122.3	186.7	96.2	228.0
Property-value benefits	200.4	6.3	9.7	13.1	23.6	147.6
Education cutbacks	(162.7)	(38.6)	(35.9)	(31.3)	(28.9)	(28.0)
Local business effects	(46.5)	(1.0)	(1.1)	(1.6)	(3.0)	(39.8)

NOTE: Quintile income shares are in percentages of total income before any incentives. All other numbers are in millions of dollars, and are calculated as the present value of dollars as of 2015. Negative numbers are in parentheses. Panel A numbers are the baseline scenario from Table 6. The alternative scenarios are identical to the baseline scenario in Table 6, except baseline has cost sensitivity of −10, and these use cost sensitivities of −3 and −17.

Alternatively, if the cost sensitivity is increased by 70 percent to −17, all groups gain from the incentive package. Again, the major reason for this is that this change significantly increases labor market benefits, because a given-sized incentive package causes more incented firms to alter their location or expansion decision, leading to larger multiplier effects and larger net job creation. Because of the increase in net job creation, there is a bigger boost to property values. Greater job creation also increases the employment-to-population ratio, which increases fiscal benefits. With higher fiscal benefits, net budget costs are lower. As a result, education cutbacks are reduced, which reduces earnings losses for cohorts of former K–12 students.

As these examples illustrate, changes in job creation not only have direct effects on labor market benefits but also indirect effects on other benefits. This pattern will show up later in this report in other scenarios: any change, whether due to policy or otherwise, that increases net job creation per dollar of incentive costs will tend to not only have greater direct labor market benefits but also indirect benefits, due to the implications for property values, net budget costs, and education cutbacks. These "spillover" effects are another type of "multiplier" effect, in the broad sense of the term "multiplier," of policies that can lead to incentive policies that are more "efficient"—that is that boost job creation more per dollar.

In this case, note that the effect of different cost sensitivities of business is asymmetric: changing the cost sensitivity of business by −7 to go from −10 to −17 has a lesser effect that changing the cost sensitivity of business by +7 to go from −10 to −3. Increasing the absolute magnitude of the cost sensitivity from −10 to −17 increases net benefits by $306.2 million ($419.8 million in Panel C versus $113.6 million in Panel A). Reducing the absolute magnitude of the cost sensitivity from −10 to −3 reduces net benefits by almost twice as much, at −$601.3 million (−$487.7 million in Panel B versus $113.6 million in Panel A.) This asymmetry occurs because of how the cost-sensitivity interacts with itself. A greater cost-sensitivity not only directly affects incented firms, but also in the model alters the magnitude of response of other private businesses to the higher business taxes brought about by paying for whatever are incentives' net budget costs. The model assumes that more business cost sensitivity applies to all businesses, not just incented businesses. A higher cost sensitivity reduces incentives' net budget costs, which makes this negative feedback effect less important. A lower cost sensitivity increases incentives' net budget costs, which makes this negative feedback effect more important. The private business job response thus depends on the interaction between the business cost sensitivity and net budget costs, which is also altered by the business cost sensitivity. The net result is a higher "multiplier" resulting from changing the cost sensitivity from −10 to −3, than from changing it in the other direction, from −10 to − 17.

Table 7 also illustrates that changes that increase net job creation, per dollar of incentive costs, not only increase net benefits but tend to do so in a progressive direction. For example, comparing Panel C to Panel A, net benefits for the lowest income quintile increase by $35.8 million ($20.1 million minus [$15.7 million]). This $35.8 million is 11.70 percent of the total net benefit increase of $306.2 million. This net gain is over twice the baseline income share of the lowest income group, at 5.08 percent. Similarly more-than-proportionate net benefit gains occur for the next two lowest income quintile groups, Quintiles 2 and 3. In contrast, the highest income quintile, Quintile 5, has net benefits increase by $112.6 million ($185.6 million in Panel C versus $73.0 million in Panel A). The increased net benefits for the highest income quintile make up 36.76 percent of the overall net benefit increase of $306.2 million. The upper income quintile's share of the overall net income gains is thus below its 51.96 percent baseline income share. The next highest income quintile, Quintile 4, also gains disproportionately less than its baseline income share.

Why does this progressive income pattern occur? When some change increases net job creation per dollar of incentive costs, this has both direct and indirect progressive effects. The boost to labor market benefits tends to be distributed progressively. The increase in fiscal benefits also tends to be distributed progressively, as it reduces the net budget costs for state and local taxpayers, and state and local taxes tend to be regressive. In addition, with lower net budget costs, education cutbacks are lower, and these education cutback burdens are distributed very regressively across income quintiles. Countering all this is that greater net job creation tends to increase property-value benefits, which are distributed regressively. But the combined effect of greater labor market benefits, lower net budget costs, and lower education cutbacks greatly outweigh the effects of greater property-value benefits.

Going in the other direction, toward lower job creation per dollar of budget costs, tends to have regressive effects on the income distribution. This can be seen in Table 7, comparing Panel B with Panel A. A lower cost sensitivity, by lowering net job creation, tends to have negative percentage effects on the bottom three income quintiles that exceed their baseline income shares, and negative percentage effects on the top two income quintiles that are less than their baseline income shares.

How are these different results under different cost sensitivities relevant to policy? Economic developers sometimes argue that they can tell what firms are most sensitive to incentives, and so can target incentives to those firms. If economic developers have such knowledge about individual firms, then such targeting makes sense, based on the Table 7 results.[77] However, I am skeptical that economic developers have such knowledge. Firms have told me, off the record, that they were offered incentives by economic developers even after they had already decided to choose the state for other reasons. In addition, firms have good reason to misrepresent their true cost sensitivity to economic developers. Economic developers will rarely be privy to the true options open to the firm, or to the firm's true bottom-line priorities.

These results are a challenge to empirical researchers. Can we narrow the range of plausible cost sensitivity of firms, so that we can provide policymakers with more precise advice? Can we provide reliable advice about which types of firms are most cost-sensitive, by industry, size, or other characteristics?

For example, knowledge is needed about the relative effectiveness of incentives aimed at job retention, versus incentives for firms making new location decisions or firms making expansion decisions. If incentives for job retention are simply cost subsidies, without any requirement for new investment, one would think the incentives would be less effective. In this case, the incentives simply temporarily lower a firm's costs. The firm may gradually adjust employment upward, but without any corresponding investment, one would think the incentive effects would be temporary.[78] On the other hand, job retention incentives may require firms to make new investments in the existing facility. Are such incentives for new investments more or less effective if they simply maintain an existing facility's current job level, versus a firm investing in a new facility, versus a firm expanding an existing facility? We don't know.[79]

.This uncertainty about firms' cost sensitivity does reduce the attractiveness of incentive policy, because it makes incentive policy riskier, in two respects. First, in dollar terms, the downside risks of a lower cost sensitivity are greater than the upside gains from a higher cost sensitivity, because

---

77 In addition, if economic developers really had such special knowledge, they could target high sensitivity of firms, and the overall cost sensitivity of the various feedback effects would stay the same. If the model is simulated with a cost sensitivity of −17 for incented firms, but with the cost sensitivity kept at −10 for all other firms, net benefits are $750.8 million, which is considerably higher than the $419.8 million in Panel C. I choose not to devote a lot of attention to this other scenario, because I view it as highly unrealistic.

78 Appendix A presents simulated effects under this scenario.

79 For example, it is possible that retention decisions are less sensitive to incentives than new location decisions, but there is no empirical evidence on this. In addition, if retention incentives tend to go to firms experiencing economic problems, perhaps any incented effects will depreciate more quickly.

of the asymmetry of effects. For example, suppose one thought that the two alternative cost-sensitivity scenarios, −3 and −17, were equally likely. The simple average of these two scenarios is negative net benefits of −$33.9 million. So, expected net benefits are lower if the cost sensitivity varies randomly around the average cost sensitivity from the research literature. Second, the public and policymakers may be risk-averse. The downside risk of the true cost sensitivity being low in absolute magnitude, with consequent significant negative benefits, may weigh more heavily in decision making than the upside gains of the true cost sensitivity being high.

Different Industry or Firm Targets: Industries or Firms with Different Multipliers

One way to increase labor market benefits of incentives is to target industries or firms with higher multipliers. It is well established in regional economics that an industry or firm will have higher multiplier effects on a local economy if it 1) pays higher wages or 2) has a more established network of local suppliers. Higher wages increase multipliers because the firm's workers will spend more at local retailers. More local suppliers increase multipliers because the greater availability is likely to tip a firm to be more likely to choose local suppliers rather than out-of-state suppliers. Input-output and regional econometric models of multipliers due to wages and supplier networks suggest a plausible range of multipliers between 1.5 and 3.5—that is, each additional job in an incented firm might lead to between 0.5 and 2.5 other local jobs. Such input-output multipliers tend to be higher for industries such as automobile manufacturing in Michigan, because the Michigan auto industry has historically paid high wages and had an extensive network of local suppliers.[80]

Multiplier effects might be even higher if, on the margin, there are agglomeration economy multiplier effects. "Agglomeration economies" are productivity increases in a local economy that are due to either the overall size of the local economy ("urbanization agglomeration economies") or the size of some industry or cluster of industries in the local economy ("localization agglomeration economies"). The sheer size of a city may lead to more specialized services, and to more diverse ideas and a diverse workforce, which may enhance productivity. Think of New York as a prototypical example. The size of an industry may lead to more specialized services for that industry, and to more specialized workers and ideas related to that industry, which may enhance productivity for that industry. Think Silicon Valley, in the computer and software industry, as a prototypical example.

But if agglomeration economies are to increase multipliers for an incented firm, agglomeration economies must increase because of the incented firm's added jobs. New York's size might make it more productive, but to increase multipliers for incented firms, it must be the case that a still-larger-size for New York City will further increase productivity. Silicon Valley's concentration in computer and software industries may make local firms in this industry more productive, but for this to be relevant to multipliers, further expansion of computers and software in Silicon Valley must lead to even greater local industry productivity.

80 Are multipliers independent of a firm or industry's cost sensitivity to incentive costs, that is its "but for" percentage for a given incentive package? The answer to this question is unclear. Having more local suppliers may both increase local multipliers and attract more firms to an area, as well as increase the firms attracted by an incentive. But does having more local suppliers increase the *ratio* of attracted firms for a given incentive size to the baseline firms attracted to the state? We don't know the answer to this question.

One empirical paper suggests that it is possible that there may be some industry agglomeration economies on the margin for high-tech industries. Moretti (2010) has estimated that some high-tech manufacturing industries may have multipliers as great as 6. It seems unlikely that such high multipliers would be due to conventional "input-output" multiplier effects stemming from firm purchases from local suppliers or worker purchases from local retailers. However, Moretti's high-tech multipliers are average multipliers for high tech manufacturing, across all levels of local high-tech manufacturing activity. For policy purposes, it would be desirable to know how such high-tech multipliers vary with either the local economy's size or its concentration of high-tech manufacturing jobs, or other local characteristics.[81]

In the current report's model, what are the consequences of different multipliers for incentive benefits? In the baseline scenario, the multiplier is 2.5. This multiplier is probably around the average input-output multiplier one might expect. In Table 8, I report results under two alternative scenarios for multipliers: 1) a multiplier of 6, which might correspond to a Moretti high-tech agglomeration economy multiplier, and 2) a multiplier of 1.5, which might correspond to a firm paying lower wages or having weaker networks of local suppliers.[82]

As Table 8, Panel B, shows, if the multiplier effect is 6, the benefits of incentive policies explode to much higher levels, both overall and for all groups. The net benefits increase from $113.6 million to $1,513.5 million, an increase of $1,399.8 million. The lowest income quintile, which lost under the baseline scenario, now obtains almost 10 percent of these net benefits, which means that this group gains proportionately more than its 5 percent baseline income share. This reflects a general pattern of the entire pattern of benefits moving in a more progressive direction, with the bottom three quintiles gaining more than their baseline income shares of the net income gains from the higher multiplier targeting, and the top two income quintiles gaining less than their baseline income shares from the higher multiplier targeting.

As outlined previously, these increased net benefits, and the increased progressivity of benefits, occurs primarily because getting higher job creation per dollar of incentive not only raises labor market benefits but has some positive spillovers in reducing net budget costs and reducing education cutbacks. First, a higher multiplier largely leads to higher net benefits because the greater boost to employment provides larger labor market benefits. Labor market benefits increase from $521.7 million with a baseline scenario multiplier of 2.5, to a multiplier 6 value of $1,418.4 million, an increase of $896.7 million. But property-value benefits and fiscal benefits also go up, and the wage losses from education cutbacks go down. Because of the higher multiplier, the resulting higher employment and population growth increase property values more. Because the higher multiplier leads to a greater boost to the employment-to-population ratio, state and local tax revenue expands much more with employment, relative to the spending needs from a higher population. Fiscal benefits increase enough that net local budget costs are greatly reduced, by $170.0 million, from $326.9 million in the baseline to $156.9 million in the multiplier 6 scenario. These higher

81 In addition, it would be helpful if Moretti's very high multipliers were confirmed with empirical estimates using other methodologies and data.

82 This multiplier of 6 may seem extremely high to some researchers. It should be kept in mind that this is the multiplier before negative feedback effects from higher costs. After such negative feedback effects, this multiplier of 6 is estimated to be reduced to an effective multiplier of 3.91. This is similar to the effective multiplier of 3.88 estimated for incented firms in Michigan by Bartik and Erickcek (2014).

Table 8 Targeting Incented Firms with Higher or Lower Multipliers

Panel A: Baseline scenario, multiplier of 2.5

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Multiplier of 6

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	1,513.5	147.2	227.4	357.5	191.6	589.7
Net local budget costs	(156.9)	(16.7)	(19.6)	(24.1)	(30.1)	(66.4)
Labor market benefits	1,418.4	166.2	241.8	369.2	190.3	450.9
Property-value benefits	398.4	12.6	19.3	26.1	47.0	293.4
Education cutbacks	(54.5)	(12.9)	(12.0)	(10.5)	(9.7)	(9.4)
Local business effects	(92.0)	(2.0)	(2.1)	(3.2)	(5.9)	(78.8)

Panel C: Multiplier of 1.5

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(286.3)	(62.3)	(50.0)	(29.2)	(70.2)	(74.6)
Net local budget costs	(375.4)	(39.9)	(46.9)	(57.6)	(72.1)	(159.0)
Labor market benefits	265.5	31.1	45.3	69.1	35.6	84.4
Property-value benefits	74.7	2.4	3.6	4.9	8.8	55.0
Education cutbacks	(233.7)	(55.4)	(51.5)	(45.0)	(41.5)	(40.2)
Local business effects	(17.4)	(0.4)	(0.4)	(0.6)	(1.1)	(14.9)

NOTE: Quintile income shares are in percentages of total income, before incentives. All other numbers are in millions of dollars, with dollars calculated as present value dollars as of 2015. Negative numbers are shown in parentheses. All assumptions are as in Table 6, except instead of multiplier of 2.5, multiplier is switched to 6 and 1.5.

net fiscal benefits are a direct benefit in the model to local residents, who as a result don't have to bear as large a net increase in the present value of taxes or a net reduction in the present value of public spending. In addition, because of these fiscal benefits, there are much reduced losses of wages from education cutbacks: these losses decrease by $139.4 million, from $193.9 million in the baseline to $54.5 million in the multiplier 6 scenario.

Furthermore, with such a high multiplier, incentive policy is less risky, in that incentives can still pay off even if firms are somewhat less sensitive to incentives than we anticipate. With a multiplier of 6, the net benefits of incentives are still positive even if the cost sensitivity parameter is reduced to −2.7, or only 27 percent of the consensus cost sensitivity from the research literature of −10.[83]

83 In other words, net benefits are positive at a cost sensitivity of −2.7 but turn negative if this cost sensitivity is further reduced (in absolute value) to −2.6.

With a very high multiplier, policymakers can afford to have a much lower batting average in tipping incentive decisions.

On the other hand, a poorly designed state incentive policy may end up going after firms in industries in which the state has few local suppliers, which will lower multipliers. In addition, if the firm pays lower wages (whether or not this means a lower wage premium), then the multiplier will also tend to be low, as lower wages mean fewer worker purchases from local retailers. In many cases, plausible multipliers for real-world incentive policies may be closer to 1.0 than to the baseline of 2.5.

Table 8, Panel C, shows the implications of a multiplier of 1.5. This lower multiplier enormously lowers the labor market benefits of the incentive policy. The result is that overall net income benefits for the entire local economy are now negative.[84] Net overall benefits do not become positive until the multiplier is increased to 2.3.

Even with a lower multiplier, net benefits may still be positive, if the cost sensitivity of incented firms is greater in absolute magnitude than the baseline scenario. With a multiplier of 1.5, if we then increase the absolute magnitude of the cost sensitivity of incented firms to −23.4, we get net benefits that are positive. However, given current empirical estimates, this sensitive a cost response of incented firms is highly unlikely.

Different Industry or Firm Targets: Lower Export-Base Percentage

Conventional economic development policy would rarely target an industry or firm that was zero percent export-base. (I will consider targeting locally oriented and locally owned small businesses a little later.) However, sometimes incentives are targeted at firms that sell partially to a local market and partially to a national market. For example, “destination” retail industries (e.g., Cabela’s stores) have sometimes received incentives on the grounds that they attract customers from outside the region. And sports stadiums have won incentives on similar grounds: that they may attract customers from outside the region. But in both cases, a sizable percentage of these incented organizations’ sales come from local customers.

Table 9, Panel B, considers the case in which incentives are provided to industries that collectively are 50 percent export-base—that is, 50 percent of the incented firms’ sales bring new dollars into the state, and 50 percent merely substitute for sales that otherwise would have gone to other local firms.

As the table shows, even if a firm or industry target is only partially non-export-base, this enormously reduces net benefits. Net benefits become negative, at minus $391.5 million, compared to

84 Note that because 1) the model equations are mostly specified as linear approximations to how the economy behaves in response to small local changes (see Appendix C), 2) the model is linear in the multiplier, and 3) the multiplier only enters at one place in the model, the net benefits end up being a linear function of the multiplier. This is confirmed by doing other model simulations: net benefits increase by $400.0 million for each change of one unit in the multiplier for incented firms. This linearization is a good approximation that should hold true for reasonable variations in a program that is small relative to the economy. The other dollar figures in the model also change linearly with the model. The interested reader can derive exact results for other multipliers, holding other parameters in the model constant, by interpolating or extrapolating from the multipliers in Table 8.

Table 9 Different Industry/Firm Targets: Lowering Export-Base Percentage from 100% to 50%

Panel A: Baseline scenario: Export Base Percentage of 100%

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Export Base Percentage of 50%

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(391.5)	(74.6)	(66.2)	(51.8)	(85.5)	(113.4)
Net local budget costs	(388.4)	(41.3)	(48.5)	(59.5)	(74.5)	(164.4)
Labor market benefits	198.2	23.2	33.8	51.6	26.6	63.0
Property-value benefits	56.0	1.8	2.7	3.7	6.6	41.3
Education cutbacks	(244.4)	(58.0)	(53.9)	(47.1)	(43.4)	(42.1)
Local business effects	(13.0)	(0.3)	(0.3)	(0.5)	(0.8)	(11.2)

NOTE: Quintile income shares are percentage shares of total income. All other numbers are in millions of dollars, and are present values as of 2015. Negative numbers are shown in parentheses.

baseline net benefits of $113.6 million, a reduction of $505.1 million. All income quintiles now suffer net income losses from the incentive.

This reduction in incentive benefits occurs because with 50 percent of the incented firms' sales in the local market, much of the incented firms' expansion comes at the expense of other local firms. Net employment effects of the incentive are significantly reduced. As has been the pattern before, this not only directly lowers labor market benefits but also increases net budget costs and increases the costs of education cutbacks. The lower export base not only lowers overall net benefits, but does so in a regressive manner. The bottom three quintiles' losses are greater than their shares of baseline income, while the losses of the top two income quintiles are somewhat less than their shares of baseline income.

Exploration with the model shows that net benefits switch from negative to positive if the export-base percentage shifts from 88 percent export base to 89 percent export base.[85] Under the baseline scenario assumptions, incentives must be tightly targeted at businesses that are almost entirely export-base in the market for their goods and services. Even relatively modest adverse effects on the sales of other local firms are sufficient to result in net benefits being negative.

85 Because of the linear nature of most of the model equations, and because the export-base percentage only enters at one place in the model, the various benefit numbers in the table vary linearly with the export-base percentage, as can be shown by the brute force method of rerunning the model for various export-base percentages. For example, each 10 percent decline in the export-base percentage yields exactly a $101.0 million reduction in net benefits. The interested reader can use the Table 9 results to extrapolate all numbers to any export-base percentage.

Different Industry or Firm Targets: Lower or Higher Wage Premia

The baseline scenario assumes that incented firms pay zero wage premia. That is, the incented firms pay exactly the wages expected based on workers' credentials (educational attainment, work experience, etc.). The assumption is that given the pressures on state economic development agencies to achieve job-creation targets, many state economic development agencies will provide aid to a wide variety of firms, whether or not they pay a high wage premium. As mentioned above, this is backed by estimates that show only modest correlations between incentives and an industry's wages.

Table 10 considers an alternative scenario, which assumes the state economic development is significantly successful in targeting firms that pay high wage premia. In Panel B, the economic development agency is assumed to be much pickier about which firms it targets. As a result, the incented firms on average pay a wage premium of 10 percent.

With high-wage premia targeting, net benefits increase in Panel B to $454.1 million, compared to the baseline scenario (Panel A) net benefits of $113.6 million, an increase of $340.4 million, which is about 67 percent of incentive budget costs. This increase is sizable for only a 10 percent wage premium. Furthermore, it should be noted that this increase may be understated. The model assumes that the wage premia is increased, and that the multiplier is unchanged. This might occur, for example, if the incented firms pay the same wages but hire workers with lower credentials. However, if the incented firms not only pay a higher wage premium but also pay a higher absolute wage, we would expect these higher wages to increase the multiplier.

With high-wage premia targeting, incentives can be efficient at more modest export-base assumptions. If the incented firms are high-wage-premia, the displacement of other competing local firms by these high-wage-premia firms will still provide labor market benefits, by increasing workers' wages for a given set of credentials. Model simulations suggest that in the Table 10, Panel B, scenario, with a 10 percent wage premium, net benefits turn from negative to positive when the export-base percentage for incented firms is increased from 54 percent to 55 percent. As mentioned above, in the baseline scenario, net benefits required an export-base percentage of 89 percent.[86]

However, in the model, the increased net benefits from an increased wage premium are distributed somewhat regressively. The increased benefits for the bottom three income quintiles, as a percentage of the total increase in net benefits, are slightly below these income quintiles' baseline income share. The top two income quintiles gain in percentage terms slightly above their baseline income shares.[87] This modest regressivity occurs because the model assumes that any increased wage premia are distributed according to the baseline labor income shares of each quintile. Because the bottom three quintiles tend to have slightly below-average shares of labor income owing to their higher transfer income, and the top two income quintiles have slightly above-average shares of

86 In addition, simulations also find that the Panel B 10 percent wage premium simulation only requires a multiplier of 1.4 for net benefits. The baseline scenario requires a multiplier of 2.3 for net benefits. And, as mentioned, we might expect the multiplier to be higher if incented firms pay a wage premium.

87 As a share of the total increase in net benefits of $340.4 million, the gain by quintile is: Quintile 1, 4.29 percent; Quintile 2, 8.32 percent; Quintile 3, 13.60 percent; Quintile 4, 21.72 percent; Quintile 5, 52.07 percent.

Table 10 Increasing the Wage Premia of Incented Jobs, under Different Assumptions about the Labor Market Effects of Wage Premia

Panel A: Baseline scenario, zero wage premium

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Wage premium of 10%

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	454.1	(1.1)	40.0	103.1	61.9	250.3
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	862.1	75.7	117.3	182.1	143.9	343.1
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

NOTE: Quintile income share numbers are percentages of total income. All other numbers are in millions of dollars, and are present values as of 2015. Negative numbers are shown in parentheses.

labor income, attracting more firms that pay higher wage premia tends to slightly skew incentive benefits in a regressive direction.[88]

The modest regressivity of increased wage premia contrasts with the progressive effects of any changes that increases overall job growth, holding incentive budget costs constant. Boosting overall job growth has progressive effects because it lowers unemployment rates and raises labor force participation rates. This disproportionately helps the lowest three income quintiles, which tend to have higher baseline rates of nonemployment. For precisely the same reason, simply increasing the wage premium of incented jobs tends to help the upper income quintiles more, as these upper-income quintiles have higher baseline employment rates.

However, as noted above, increasing the wage premium may also increase the multiplier. If so, the strongly progressive effects of increasing the multiplier are likely to outweigh the modestly regressive distribution of benefits from just increasing the wage premium.

88 This conclusion about regressivity might change if one assumed that higher wage premia have labor supply effects, which might vary by quintile in a progressive direction. The distributional effect of higher wage premia is an important topic for future research.

ALTERNATIVE SCENARIOS, GROUP 2: ALTERNATIVES VARYING IN HOW INCENTIVES ARE DESIGNED AND FINANCED

I now turn to considering different incentive design and financing. To analyze incentive design and financing, these scenarios hold constant the cost sensitivity of incented firms, and they hold constant local multipliers. Instead of varying those two factors, these scenarios consider alternative incentive designs and financing that may cause different net benefits for two reasons: 1) for a given incentive budget cost, they deliver a different cost reduction to incented firms, and 2) for given incentive budget costs, they have different opportunity costs in the local economy.

Specifically, the alternative scenarios in this group include the following:

- Incentives that are efficient economic development services, delivering more than a dollar of cost reduction to incented firms per dollar of budget costs
- Incentives that are delivered either more up front or more over time, which may be valued differently by incented firms, per dollar of budget costs
- Incentives that are financed by public spending cuts in various public services, or tax increases in various taxes, which may have different local economic effects
- Incentives in economies with different budget structures, so that incentives have different fiscal benefits, which affects incentives' opportunity costs

Different Incentive Designs: Efficient Incentive Services

When we think of incentives, we tend to think of "cash" incentives that either reduce business tax payments or directly pay cash—property tax abatements, for example, or refundable job-creation tax credits.

However, we can also encourage business location and expansion decisions through various customized services. Examples of such customized services include customized job-training programs and manufacturing extension services. CJT programs provide companies with trained workers who are suited to the company's specific job-skill needs. Manufacturing extension services help facilitate the company's access to high-quality information on how to lower costs or improve sales, through expert consulting advice.

Some studies suggest that such customized services may have 10 times the effect per dollar of incentive costs as tax incentives and other cash incentives. For example, this finding is suggested by research by Hollenbeck (2008), Holzer et al. (1993), and Hoyt, Jepsen, and Troske (2008) on customized job training, and by work by Jarmin (1998, 1999) and Ehlen (2001) on manufacturing extension services.[89]

---

89 This research on the productivity and other effects of customized business services is reviewed in Bartik (2010) and in Bartik (forthcoming). The most rigorous quasi-experimental studies are by Jarmin (1998, 1999) and Holzer et al. (1993). The Jarmin (1999) estimates suggest productivity increases that last at least two years and that have a present value (using a firm discount rate of 12 percent) for those two years alone of 5.4 times program costs. The Holzer et al. (1993) estimates suggest reduced scrappage rates that last at least two years and have a present value (using the

Table 11 Net Local Income Effect of Providing Incentive through Efficient Economic Development Services

Panel A: Baseline scenario, each dollar of incentives has same dollar effect on location decisions

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Efficient customized service incentives, each dollar of incentives has 10 times that effect on location decisions of cash

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	5,430.7	603.5	831.4	1,199.4	761.6	2,034.7
Net local budget costs	320.6	34.1	40.1	49.2	61.5	135.8
Labor market benefits	3,926.7	460.1	669.4	1,022.0	526.8	1,248.4
Property-value benefits	1,100.0	34.7	53.2	72.1	129.8	810.1
Education cutbacks	337.4	80.0	74.4	65.0	59.9	58.1
Local business effects	(254.1)	(5.4)	(5.7)	(8.9)	(16.4)	(217.6)

NOTE: Quintile income shares are percentages of total income. All other numbers are in millions of dollars, and are present values as of 2015. Negative numbers are shown in parentheses.
The alternative scenario in Panel B assumes that incentives are provided at the same costs, but that they affect business location and expansion decisions by about 10 times what would be expected based on budgetary costs.
Such high effectiveness of incentives has been found, for example, in some studies of customized job training and manufacturing extension services.
Note that in the high-efficiency scenario, net budget costs are positive—that is, incentives more than pay for themselves.
Exploration with the model indicates that net budget costs turn positive as incentive efficiency ratio goes from 4.3 to 4.4.

In Table 11, the model is used to simulate the impact on net incomes of providing incentive services that have 10 times the effectiveness of cash incentives.

As can be seen, this enormously expands net income benefits, increasing them from the baseline of $113.6 million to $5,430.7 million, an increase of $5,317.1. This largely occurs because at the same budget costs of incentives, we get 10 times the effect on firms' costs, and hence a much greater effect on location and expansion decisions.[90] The same dollar value of incentives that, in the baseline, is assumed to tip 11.70 percent of incented firms' location and expansion decisions, is with this heightened effectiveness estimated to tip 73.30 percent of incented firms' location and expansion decisions.[91]

---

firm's discount rate of 12 percent) for those two years of 4.9 times the government's training costs. Hoyt, Jepsen, and Troske's (2008) regression analysis of Tennessee county growth suggests that the costs of creating jobs by customized training are about 10 percent of the costs of creating jobs via tax incentives—that is, customized job training has 10 times the effectiveness of customized services. Only some modest persistence beyond two years in the Jarmin and Hollenbeck estimated effects would be needed to get to a 10-to-1 effectiveness ratio.

90 The model assumes firms act as if incentive cost savings are 10 times incentive costs.

91 The present value of incentive costs divided by the present value of job-years yields a cost per job-year of $2,230. The survey evidence on manufacturing extension and customized job training if anything suggests an even lower present value cost per job-year. For manufacturing extension, Ehlen (2001) finds a one-time cost per job created or retained

As was shown before, if we assume greater job effects per dollar of budget costs, this not only directly boosts labor market benefits and property-value benefits, but also indirectly lowers budget costs and reduces the costs of education cutbacks. In the "ten times cash effectiveness" scenario, these effects are particularly extreme. The net budget costs of incentives turn positive—that is, fiscal benefits increase enough that incentives more than pay for themselves. Incentives improve the budgetary situation of state and local governments enough that education cutbacks become education spending boosts, with consequent increased wages.

The resulting distribution of net benefits becomes highly progressive. For example, in Panel B of Table 11, the net benefits of the lowest income quintile, Quintile 1, are 11.11 percent of overall net benefits, more than double this quintile's baseline income share of 5.08 percent.[92] In the alternative scenario, the lowest income quintile not only gains from greater labor market benefits, but it also gains because of net budget surpluses and consequent boosts to education spending.

In contrast, the benefits of the highest income quintile, Quintile 5, are 37.47 percent of net benefits, a quarter below this quintile's baseline income share of 51.96 percent.[93] Although the highest income quintile gains from this greater job creation, its relative gains are not as great as for lower income quintiles.

Even though there is empirical evidence that economic development services can have much larger effects per budget dollar than tax incentives, an assumed greater effectiveness of 10 times may seem somewhat extreme. However, there are very large net benefits of economic development services that are even modestly more productive than tax and other cash incentives. For example, in other simulations, if economic development services are assumed to have an effectiveness of two times tax incentives, net benefits increase from the baseline scenario of $113.6 million to $1,016.2 million, an increase of $902.6 million.[94] Furthermore, even with this more moderate assumed increase in incentive cost-effectiveness, incentive effects are far more progressive, with the lowest income quintile getting 8.80 percent of net benefits. Further experimentation suggests that getting incentives to "pay for themselves," with fiscal benefits exceeding incentive costs, only requires an incentive effectiveness-to-cost ratio of 4.4.[95]

It should be recognized that the appropriate scale of economic development services such as customized job training and manufacturing extension services are limited by the market failures they overcome. Such services only have a high bang for the buck because they overcome market failures that inhibit some firms from becoming as productive as efficiency would permit (Bartik 1990). For example, various information and financing barriers may prevent many small and medium-sized

---

of $18,701 (converted to 2015 dollars, as are all figures in this report). For customized job training, Hollenbeck (2008) finds a one-time cost per job created or retained of $15,787. But this is the cost of a job-year if the jobs created have zero persistence. Even a modest degree of persistence would lower the cost per present value of job-years to $2,000 or even lower.

92 11.11 percent = $603.5 million divided by $5,430.7 million.

93 37.47 percent = $2,034.7 million divided by $5,430.7 million.

94 Given the model's assumptions of diminishing marginal returns to cost reductions for incented firms (Appendix D), the change in net benefits as incentive effectiveness increases is nonlinear. For example, while going from 1-for-1 effectiveness to 2-for-1 increases net benefits by $902.6 million, going from 9-for-1 effectiveness to 10-for-1 increases net benefits by $346.8 million. However, this is an artifact of model assumptions.

95 In other words, the net present value of budget costs turns from negative to positive as we go from incentive effectiveness of 4.3 to effectiveness of 4.4.

manufacturers from getting access to high-quality advice on how to lower their costs and broaden their markets, or from being able to provide cost-effective training for workers. Therefore, the scale of such services is limited by the extent of such market failures. A well-designed program of such services will not serve all businesses but rather the subset of businesses that experience such market failures.

In contrast, it might seem that tax incentives and other cash incentives can be delivered at any scale. There is an unlimited demand for such cash incentives from new business locations or expansions, or from businesses seeking retention incentives, whereas only a subset of firms will even be interested in accessing manufacturing extension and customized training services, let alone be appropriate targets for such services. However, the unlimited demand for cash incentives is more of a bug than a feature. As this paper has already suggested, to have significant benefits for all groups, cash incentives should be carefully targeted at firms that are likely to offer high social benefits—for example, firms with high multipliers, which is only a subset of the virtually unlimited set of firms who are interested in cash incentives. The political barriers to doing the appropriate targeting of cash incentives are great, given that state policymakers have some reluctance to say “No” to selected firms. In contrast, it is easier to appropriately target in-kind services such as customized training and manufacturing extension, as the appropriate targets are to some extent self-selected.

Different Incentive Design: More Up-Front or More Ongoing Incentives?

The average state and local incentive regime is front-loaded. Incentives are greatest in the first year of the project, then diminish in the second through the tenth year, then diminish a lot more after the tenth year.

Providing up-front incentives is more socially “efficient,” in that business location and expansion decision makers are believed to be relatively myopic, compared to what should be the attitude of policymakers. According to research by Poterba and Summers (1995), business decision makers making investment decisions use an effective real discount rate of about 12 percent. This means that incentives provided in future years play relatively little role in investment and expansion decisions. At a 12 percent real discount rate, a dollar of incentives provided in Year 11 is worth only 32 cents in Year 1, for example. Therefore, a property tax abatement or some other incentive provided in Year 11 would be expected to have relatively little effect on location or expansion decisions.

In contrast, benefit-cost analysis theory suggests that if policymakers are seeking to maximize the overall interests of society, they should not so heavily discount the future. The only completely defensible reason for discounting the future is that in the future we will be wealthier, but this plausibly only justifies a discount rate of 1 to 3 percent. (See Bartik [2011] for a more extensive discussion.) A commonly used real discount rate that is advocated for use by policymakers is a real discount rate of 3 percent. At a 3 percent discount rate, a dollar of incentive costs that occurs 11 years from now is equivalent for policymakers to 74 cents provided today. Therefore, the implication is that policymakers, to maximize effects on business decision makers relative to costs to society, should front-load incentives, substituting incentives today for incentives 10 years from now.

What if, instead of providing front-loaded incentives, policymakers provided uniform incentives over time? This might occur, for example, if policymakers simply agreed with a new firm to perpetually give it a lower tax rate on profits or property.

Panel B of Table 12 shows this uniform incentive provision scenario's effects on incomes of different types for different income groups.

The uniform incentive is scaled so that it has the same present value of budget costs, at $508.5 million, as the baseline relatively front-loaded incentive package. However, because firms are relatively myopic, providing incentives far into the future has less effect on location decisions.

Table 12 Effects on Incentive Returns of Different Timing of Incentives

Panel A: Baseline scenario: timing of incentives matches "average" state, which has some up front and some over time

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Uniform incentives over life of project

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(320.7)	(63.3)	(53.5)	(36.9)	(74.3)	(92.7)
Net local budget costs	(381.3)	(40.6)	(47.6)	(58.5)	(73.2)	(161.5)
Labor market benefits	228.5	26.8	39.0	59.5	30.7	72.6
Property-value benefits	62.9	2.0	3.0	4.1	7.4	46.3
Education cutbacks	(215.5)	(51.1)	(47.5)	(41.5)	(38.2)	(37.1)
Local business effects	(15.2)	(0.3)	(0.3)	(0.5)	(1.0)	(13.0)

Panel C: Up-front incentives

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	453.5	22.9	63.5	129.8	37.1	200.1
Net local budget costs	(285.9)	(30.4)	(35.7)	(43.8)	(54.9)	(121.1)
Labor market benefits	743.8	87.1	126.8	193.6	99.8	236.5
Property value benefits	210.3	6.6	10.2	13.8	24.8	154.9
Education cutbacks	(166.1)	(39.4)	(36.6)	(32.0)	(29.5)	(28.6)
Local business effects	(48.5)	(1.0)	(1.1)	(1.7)	(3.1)	(41.6)

NOTE: Quintile income shares are percentages of total income. All numbers are in millions of dollars, and are present values as of 2015. Negative numbers are shown in parentheses.
These scenarios differ from the baseline scenario in assuming different timing of incentives.
Each panel considers different timing. The different timings all have the same present value from a social perspective (at 3% discount rate), of $508.5 million. Therefore, the ratio of benefits to incentive costs is (net plus 508.5)/508.5. However, the present value from the firm's perspective will differ, which drives different economic effects. See later table for these figures.
The present values reported in this table, as well as generally in other tables, use a 3% discount rate, which is assumed to be the appropriate social discount rate.

The incentive provided to some firm 11 years from now, or certainly 21 years from now, has much less effect on location decisions, compared to its effects from a social perspective. As shown at the bottom of Table 13, the present value from the firm's perspective of this uniform incentive provision is only $121.9 million, which is less than one-fourth of its present value of $508.5 million from a social perspective. As a result, the uniform incentives are estimated to tip only 6.44 percent of incented firms' location decisions. This tipping rate is considerably less than is achieved for the same $508.5 million in costs (from a social perspective) in the baseline scenario, shown in Panel A. In the baseline scenario, the same $508.5 million in social costs ends up tipping 11.70 percent of incented firms' location decisions.

Because providing incentives uniformly over time has a lesser impact on firms' location decisions, per dollar of budget costs from a social perspective, net benefits are much lower. As shown in Table 12, Panel B, net benefits become negative at $320.7 million, compared to the baseline scenario's net benefits of $113.6 million, a reduction of $434.3 million. As with other cases in which net job creation varies with the same budget costs, most of the net benefit changes occur because of the change in labor market benefits, but there are also changes due to reduced property-value benefits, higher budget costs because of lower fiscal benefits, and greater wage losses from larger education cutbacks. Overall, labor market benefits decline by $293.2 million ($228.5 million in Panel B minus $521.7 million in Panel A), which is 68 percent of the total decline in net benefits of $434.3 million.

As occurred with other scenarios, the progressivity of incentives tends to follow the magnitude of job creation for a given budget cost. Therefore, switching to uniform incentives, because it lowers job creation for a given budget cost, tends to have regressive effects on the income distribution. The bottom three income quintiles' losses, as a percentage of total losses, exceed their baseline income shares, while the upper two income quintiles' losses are less than their baseline income shares.

The most efficient timing of incentives is to make them totally up front, as then policymakers get a higher "firm perspective" bang for the same "social perspective" buck. This scenario is shown in Panel C.[96] With the up-front incentives, at the same social cost of incentives of $508.5 million, the incentive package ends up tipping 15.80 percent of incented firms' location decisions. Net benefits overall now are $453.5 million, compared to the baseline of $113.6 million, an increase of $339.9 million. About two-thirds of this increase is in higher labor market benefits, but there are also higher property-value benefits, lower budget costs, and lower education cutbacks. The increased benefits are distributed progressively, as the lower-income quintiles gain a greater-than-baseline share of labor market benefits, fiscal benefits, and wage gains from reduced education cutbacks.

Examples of relatively front-loaded incentives would be training incentives or infrastructure incentives. These incentives are typically delivered to firms within a year or two. However, an incentive of any type can be designed so that it is up front. For example, investment incentives or job creation tax credits can be designed with a limited term.

Up-front tax incentives have one key disadvantage compared to incentives paid over time: if the firm closes or downsizes sooner than expected, then up-front incentives will have incurred extra

96 Incentives are totally up front for the initial 20-year period. After Year 20, up-front incentives are provided to offset depreciation, which results in some steady incentives from then on.

Table 13 Costs of Different Incentive Timings

	Panel A: Costs as percentage of value-added			Panel B: Actual dollar costs (in millions of 2015 dollars)		
Year of new facility operation	Baseline	Uniform	Up-front	Baseline	Uniform	Up-front
1	3.54	0.66	17.07	62.8	11.8	302.7
2	1.69	0.66	0.00	30.3	11.9	0.0
3	1.64	0.66	0.00	29.7	12.0	0.0
4	1.58	0.66	0.00	29.0	12.2	0.0
5	1.50	0.66	0.00	27.9	12.3	0.0
6	1.35	0.66	0.00	25.4	12.5	0.0
7	1.29	0.66	0.00	24.5	12.6	0.0
8	1.21	0.66	0.00	23.2	12.8	0.0
9	1.17	0.66	0.00	22.7	12.9	0.0
10	1.14	0.66	0.00	22.5	13.1	0.0
11	0.40	0.66	0.00	8.0	13.2	0.0
12	0.39	0.66	0.00	7.9	13.4	0.0
13	0.30	0.66	0.00	6.2	13.6	0.0
14	0.30	0.66	0.00	6.2	13.7	0.0
15	0.30	0.66	0.00	6.2	13.9	0.0
16	0.25	0.66	0.00	5.4	14.1	0.0
17	0.25	0.66	0.00	5.4	14.2	0.0
18	0.25	0.66	0.00	5.5	14.4	0.0
19	0.25	0.66	0.00	5.5	14.6	0.0
20	0.25	0.66	0.00	5.5	14.7	0.0
21	0.09	0.66	0.44	2.1	14.9	10.0
22	0.14	0.66	0.44	3.1	15.1	10.1
23	0.18	0.66	0.44	4.1	15.3	10.2
24	0.22	0.66	0.44	5.1	15.5	10.3
25	0.26	0.66	0.44	6.1	15.7	10.4
26	0.29	0.66	0.44	7.0	15.8	10.6
27	0.33	0.66	0.44	7.9	16.0	10.7
28	0.36	0.66	0.44	8.7	16.2	10.8
29	0.39	0.66	0.44	9.6	16.4	10.9
30	0.42	0.66	0.44	10.4	16.6	11.1
31	0.43	0.66	0.44	10.8	16.8	11.2
32	0.44	0.66	0.44	11.2	17.0	11.3
33	0.45	0.66	0.44	11.6	17.2	11.5
34	0.45	0.66	0.44	11.9	17.4	11.6
35	0.46	0.66	0.44	12.2	17.6	11.8
36	0.47	0.66	0.44	12.6	17.8	11.9
37	0.47	0.66	0.44	12.9	18.1	12.0
38	0.48	0.66	0.44	13.2	18.3	12.2
39	0.49	0.66	0.44	13.6	18.5	12.3
40	0.49	0.66	0.44	13.9	18.7	12.5
41 and after	0.49	0.66	0.44	Annual growth at 1.2% to match value-added growth		
Present value from social perspective (3 percent discount rate)	508.5	508.5	508.5			
Present value from firms' perspective (12 percent discount rate)	227.3	121.9	313.4			

NOTE: All these incentive timing regimes are adjusted so that present value from social perspective, using 3% discount rate, will be $508.5 million. However, present value from firm's perspective, at 12% discount rate, will differ. Baseline is average in 2015 for 33 states examined in Bartik (2017).

"Up-front" connotes all incentives in year for initial incentives. After Year 20, "up-front" provides scaled-back up-front incentives to offset assumed depreciation. Uniform is same % incentive each year forever. Note that the firm discounting at 12% considers all future incentives in determining the relevant incentive percentage that drives firms' location decisions.However, the social discounting at 3% only considers the uniform incentive rate costs through Year 80, to be consistent with the other benefits and costs in the model. Dollar cost figures are calculated for firms that maintain 10,000 jobs infinitely, with real value-added per FTE worker growing at 1.2 percent annually.

costs. In contrast, incentives paid out over time are argued by some policymakers to have the advantage of only paying out based on performance. Of course, this advantage is purchased at a large price: many of these long-term incentive dollars do not have much effect on location or expansion decisions per dollar, but they undermine future local tax bases and public services.

To help overcome this disadvantage of up-front incentives, tax incentives and other cash incentives can incorporate "clawback" provisions. Under clawbacks, which are included in many incentive contracts between firms and state and local governments, a portion of the already-paid incentives are paid back by the firm if the firm closes or downsizes within a specified time period (Weber 2002, 2007). With such clawbacks, up-front tax incentives can have a larger location effect per incentive dollar, yet still reduce costs for incented projects that do not work out. Furthermore, because firms heavily discount the future, and are unlikely to expect to downsize or close the facility within the specified time period, clawback provisions should have zero effect or at most modest effects in discouraging location decisions.

In addition, up-front incentives such as customized training, or specialized infrastructure incentives such as access roads, could be argued to have "automatic" clawbacks. For example, if the firm closes down, the infrastructure that is built will remain and help the area recover by attracting some other firm. Customized training will also, to some extent, be "sticky." Even if the incented firm closes down, many of the trained workers will remain in the same local area. A larger pool of well-trained local workers will help the area recover from the plant closing, and will attract other jobs.

Financing of Incentives: Consequences of Financing Incentives by Spending Cuts, Particularly on Productive Services Such as Education

I now turn to considering the effects of how incentives are paid for. This has effects on overall benefits both by affecting local demand for goods and services and by supply-side effects from local business tax increases and education spending cutbacks. In addition, the sources of financing influence the distribution of benefits, because state and local taxes versus services, and different types of taxes and services, have different distributions of their costs and benefits across income quintiles.

The baseline scenario of Table 6 considered an incentive package that was 50 percent financed by tax increases and 50 percent by public spending cutbacks. The tax increases were assumed to be distributed similarly to average state and local taxes: 44.1 percent was assumed to come from higher business taxes and the remaining 55.9 percent from higher household taxes. The spending cutbacks were assumed to be distributed similarly to average state and local public spending: 22.1 percent was assumed to come from lower spending on K–12 education and the remaining 77.9 percent from cuts in other public spending. [97] These percentage allocations also apply to any fiscal benefits generated because of the incentives increasing state and local tax revenue more than spending needs.

97 These assumptions about shares from different sources were discussed previously in the paper, but they come in part from the Census of Governments for education's spending share, and from Ernst and Young (Phillips, Sallee, and Peak 2016), for the business share of state and local taxes.

In this section, I consider replacing this baseline scenario with two alternative scenarios, in which all the financing of incentives comes from public spending cuts. In the following section, I consider the opposite case, with two alternative scenarios in which all financing of incentives comes from tax increases.

Table 14, Panel B, considers a public-spending-cut scenario in which incentives are financed by across-the-board public spending cuts. With across-the-board spending cuts, only 22.1 percent of the spending cuts come from K–12 spending. In the model, only K–12 spending is assumed to have effects on productivity. Panel C of Table 15 considers a public spending cut scenario in which incentives are financed 100 percent by cuts in K–12 spending. Alternatively, this Panel C scenario is equivalent to assuming that public spending cuts in general have productivity consequences similar to cuts in K–12 spending.

In the across-the-board spending cut scenario (Panel B), the net impact on local incomes turns negative overall at −$191.4 million.[98] Furthermore, all income quintiles lose except for the highest income quintile. Public-spending financing has more negative overall effects because it does not have the benefit of exporting some costs to nonlocal business owners. In addition, public spending cuts have very regressive effects by income quintile. Finally, with 100 percent public-spending financing, rather than 50 percent, the negative impact of education cutbacks on future wages more than doubles in Panel B, to −$394.9 million, compared to the −$193.9 million in Panel A's baseline scenario.

When we instead assume that incentives are financed 100 percent by cutbacks in K–12 spending (Panel C), the result is very large net local income losses overall, of −$2,252.4 million.[99] These losses are largely driven by the very large negative impacts of K–12 spending cutbacks on future wages, which yield a net negative impact of −$2,063.5 million.[100] These education cutback impacts are very regressively distributed, so that the lowest income quintile actually bears the largest percentage share of the overall net income losses, at around −$528.1 million. The upper income quin-

98 The effects of the share of public-spending financing on net benefits, and the other variables, is close to but not perfectly linear. For example, going from 50 percent to 60 percent financing by public spending cuts reduces net benefits by $60.1 million, whereas going from 90 percent to 100 percent financing by spending cuts reduces net benefits by $61.9 million. The percentage of financing from public spending enters the model linearly, but it enters the model several places and interacts with itself. For example, the public spending percentage affects both the initial demand-side multiplier, but it also affects later fiscal benefits, which will then interact with the public spending percentage to affect the magnitude of effects of fiscal benefits. Therefore, second-order terms involving public spending squared, or even higher-order terms, implicitly affect the final results.

99 As was true with the public spending percentage, the effect of the K–12 spending on net benefits and other model results is close to linear but not perfectly so. For example, with 100 percent financing by public spending, going from 25 percent to 50 percent of the financing from K–12 lowers net benefits by $604.1 million; going from 75 percent to 100 percent financed by K–12 lowers net benefits by $728.1 million. Because the public spending percentage implicitly affects the model in several places, even though it enters linearly each time, this percentage ends up interacting with itself and producing some nonlinear effects.

100 These results are as expected, based on the large educational productivity effects of school spending in the underlying estimates from Jackson, Johnson, and Persico (2016). As mentioned above, their estimates imply a benefit-cost ratio for the effects of school spending on future earnings at a national level of 4.95. In Table 14, Panel C, the ratio of earnings losses from education cutbacks of $2,063.5 million, to local budget costs of $454.1 million, is 4.54. The local-level ratio will be lower because of out-migration, and higher because of agglomeration economies. In addition, some of the education cutback effects on wages occur beyond the Year 80 limit to this simulation model, which further reduces the local ratio of wage losses to education cutbacks.

Table 14 Implications of Financing Incentives from Public Spending Cuts and from Education Spending Cuts

Panel A: Baseline scenario: Incentives financed half through spending cuts, half through tax increases, and 22.1% of spending cuts are K–12 education spending

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Financing 100% by Public Spending Cuts, with K–12 Spending 22.1% of this total

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(191.4)	(88.5)	(55.6)	(4.8)	(63.1)	20.7
Net local budget costs	(396.8)	(56.5)	(58.8)	(65.3)	(73.6)	(142.7)
Labor market benefits	494.3	57.9	84.3	128.7	66.3	157.1
Property-value benefits	138.4	4.4	6.7	9.1	16.3	101.9
Education cutbacks	(394.9)	(93.7)	(87.1)	(76.1)	(70.1)	(68.0)
Local business effects	(32.4)	(0.7)	(0.7)	(1.1)	(2.1)	(27.8)

Panel C: Financing 100% by education spending cuts

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(2,252.4)	(528.1)	(490.6)	(417.2)	(421.7)	(394.9)
Net local budget costs	(454.1)	(66.6)	(76.4)	(81.6)	(91.4)	(138.2)
Labor market benefits	226.1	26.5	38.5	58.9	30.3	71.9
Property-value benefits	56.3	1.8	2.7	3.7	6.6	41.5
Education cutbacks	(2,063.5)	(489.4)	(455.1)	(397.6)	(366.2)	(355.3)
Local business effects	(17.2)	(0.4)	(0.4)	(0.6)	(1.1)	(14.8)

NOTE: These simulation scenarios consider the same incentive package and differ solely in how the incentive is financed (and how fiscal benefits, if any, are used).

Default in baseline scenario of Panel A is 50% taxes, 50% public-spending financing, with 44.1% of the increased taxes from business taxes, and 22.1% of the reduced spending from K–12 education spending.

In all scenarios, productivity of education spending is 0.7743. In Panel C, total net benefits become positive if this is reduced to 0.1053, which is only 14% of the 0.7743 estimate of education spending productivity.

Net benefits for lowest-income quintile become positive if education spending productivity is reduced to 0.0225, which is 3% of the 0.7743 estimate.

Quintile income shares are percentages of total income. All other numbers are in millions of dollars, and are present values as of 2015. Negative numbers are shown in parentheses.

tile also loses, but it has the lowest loss of all income quintiles. This pattern occurs largely because the model assumes that the earnings impacts of educational quality changes are distributed fairly evenly across the income distribution.

These estimates of the costs of education cutbacks are based on the Jackson, Johnson, and Persico (2016) estimates of the productivity of education spending. But such estimates always are uncertain, for many reasons. How much lower would the productivity of education spending have to be to avoid such negative net income effects? With some experimentation with the model, it can be shown that if incentives are financed by cuts in K–12 education spending, one does not get positive effects of incentives unless educational productivity is assumed to be less than 14 percent of the education spending productivity effects estimated by Jackson, Johnson, and Persico.[101] In order for incentives financed by reduced education spending to pay off for the lowest income quintile, the productivity of education spending would have to be assumed to be less than 3 percent of the effects estimated by Jackson, Johnson, and Persico.[102] Therefore, it is unlikely that education-financed incentive policies, for an incented firm with a typical multiplier, can be made to pay off for the local economy or for the lowest income quintile if one assumes even somewhat minimal productivity effects of such education spending.

Education-financed incentives can be made to pay off for the local economy if one assumes sufficiently robust effects of incentives on job growth. With the productivity effects estimated by Jackson, Johnson, and Persico, and with 100 percent education-financed incentives, the net present value of income benefits for the entire local economy turns positive when the assumed multiplier increases from 5.0 to 5.1. Because education cutbacks are highly regressive, it takes a higher multiplier to turn net income benefits positive for the lowest income quintile: the multiplier must be at least 6.0. According to some estimates, such high multipliers might be possible for some high-tech manufacturing firms. However, such multiplier effects are well beyond typical multiplier effects for the typical incented firm.[103]

Financing of Incentives: Consequences of Financing Incentives by Tax Increases, Particularly by Business Taxes

In this section, I turn from financing incentives by public-spending cutbacks to the opposite extreme: incentives are financed instead by tax increases. One scenario considers across-the-board tax increases, with the same pattern as average state and local taxes: 44.1 percent of the tax increases coming in business taxes. The other scenario assumes 100 percent of incentive costs are financed by higher business taxes.[104]

---

101 The elasticity of wages with respect to education spending estimated by Jackson, Johnson, and Persico is 0.7743. This elasticity must be reduced to 0.1053 for incentives financed by lower education spending to pay off for all local residents. The decimal value 0.1053 is 13.6 percent of 0.7743.

102 To get benefits for the lowest income quintile from incentives financed 100 percent by cuts in education spending, the educational productivity elasticity must be reduced to 0.0225. This is 2.9 percent of the elasticity estimated by Jackson, Johnson, and Persico.

103 If we assume 100 percent financing by education cutbacks, the baseline scenario's education productivity assumptions, and the baseline scenario's multiplier of 2.5, there is no cost-sensitivity parameter that will allow net benefits to be positive. Increasing the cost-sensitivity parameter is insufficient because this also increases negative cost feedbacks.

104 The model as currently designed only incorporates differences in local economic effects between business taxes

In the model, all tax increases have some demand-side effects on the local economy. However, only higher business taxes have a supply-side impact on the local economy. Higher business taxes tend to reduce growth of other local jobs, thus partially offsetting the positive effects of the incented firms that are induced and the consequent multiplier effects. But higher business taxes also allow more of the costs of incentives to be exported to out-of-state business owners. Which effect dominates?

As Table 15 shows, when incentives are financed 100 percent by higher taxes, net benefits go up 3.6 times compared to the baseline, from the $113.6 million of the baseline scenario (Panel A) to $408.1 million. Benefits are also distributed far more progressively, with the lowest income quintile switching from a net loss in the baseline of $15.7 million to a net gain in Table 16, Panel B, of $54.6 million. The lower income quintile's gain in Panel B of $54.6 million is 13.38 percent of overall net benefits, more than twice Quintile 1's baseline share of overall income of 5.08 percent. The reason for this pattern of effects largely has to do with three factors. First, switching to tax financing eliminates the negative effects of education cutbacks, which are particularly severe for the lowest income quintile. Second, 100 percent tax financing allows more exporting of the cost of the incentive package to nonlocal owners of business. Third, although state and local taxes are regressively distributed by income quintile, it is still true on average that increasing state and local taxes has less regressive effects by income quintile than cutting state and local public spending—the benefit-cost ratio for public spending versus taxes at the state and local level tends to be higher for lower income quintiles.

Table 16, Panel C, considers financing 100 percent of incentive costs by higher business taxes. Net benefits considerably increase, to $501.1 million, compared to $113.6 million in the baseline scenario. [105] As with Panel B, the negative impacts of education cutbacks are eliminated, which is a big part of the picture. Another factor is that with 100 percent business-tax financing, net local budget costs of incentives are much reduced. Net local budget cuts in the Panel C scenario are −$102.8 million, compared to −$326.9 million in the baseline scenario. These lower budget costs come about because the business-tax financing allows most of the costs of financing incentives to be "exported" to nonlocal business owners. The model assumes that 74 percent of business-tax-increase costs are borne by out-of-state business owners.[106] These advantages of business-tax financing more than offset the negative supply-side effect of increased business taxes on the growth of other local jobs.[107] Labor market benefits and property-value benefits in the Table 16,

---

and non-business taxes, although the mix of non-business taxes is implicitly used to drive the share of non-business taxes paid by different groups. The model could be extended to flexibly allow for differences due to what type of non-business tax is increased to finance incentives, for example sales taxes versus income taxes.

105 As with the K–12 spending percentages, the business tax percentage has slightly nonlinear effects on net benefits and other model results. For example, with 100 percent tax financing, going from 50 percent to 75 percent of taxes from business increases net benefits by $41.1 million; going from 75 percent to 100 percent increases net benefits by $42.3 million. The business tax percentage variable enters the model linearly, but at several places, interacting with itself.

106 This calculation of "burden" does not adjust for the effects of changes in other local business costs on the profits of businesses owned by out-of-state owners. However, from a local budget perspective it is irrelevant what is the net profit change borne by out-of-state owners, except insofar as it affects equilibrium employment.

107 The potential importance of tax exporting in evaluating state business-tax policy has recently been empirically explored by Suarez Serrato and Zidar (2016). They estimate that 40 percent of state corporate taxes may be paid for by the firm owners, even when firms change their location decisions significantly in response to state corporate income tax rates.

Table 15 Implications of Financing Incentives Totally from Taxes, and Totally from Business Taxes

Panel A: Baseline scenario: Incentives financed half through spending cuts, half through tax increases, and tax increases are financed 44.1 percent from higher business taxes

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Financing 100% by taxes

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	408.1	54.6	76.6	116.2	37.2	123.5
Net local budget costs	(259.1)	(13.7)	(23.5)	(35.3)	(52.3)	(134.3)
Labor market benefits	548.0	64.2	93.4	142.6	73.5	174.2
Property-value benefits	154.5	4.9	7.5	10.1	18.2	113.8
Education cutbacks	0.0	0.0	0.0	0.0	0.0	0.0
Local business effects	(35.4)	(0.8)	(0.8)	(1.2)	(2.3)	(30.3)

Panel C: Financing 100% by business taxes

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	501.1	60.8	87.3	130.4	68.5	154.1
Net local budget costs	(102.8)	(1.1)	(3.3)	(6.9)	(12.5)	(79.0)
Labor market benefits	496.5	58.2	84.6	129.2	66.6	157.8
Property-value benefits	139.6	4.4	6.8	9.2	16.5	102.8
Education cutbacks	0.0	0.0	0.0	0.0	0.0	0.0
Local business effects	(32.2)	(0.7)	(0.7)	(1.1)	(2.1)	(27.6)

NOTE: These simulation scenarios consider the same incentive package and differ solely in how the incentive is financed (and how fiscal benefits, if any, are used).
Default in baseline model of panel A is 50% taxes, 50% public-spending financing, with 44.1% of the increased taxes coming from business taxes.
Quintile income shares are percentages of total income. All other numbers are in millions of dollars, and are present values as of 2015. Negative numbers are shown in parentheses.

Panel C, scenario stay close to the baseline scenario, which reflects countervailing negative effects of increased business taxes on other jobs, combined with the fact that business financing has fewer negative demand-side effects on the local economy—74 percent of the business taxes are paid by out-of-state owners, and of the 26 percent of business taxes paid by local owners, 66.8 percent are paid by the top 10 percent of the income distribution, based on IRS incidence assumptions, and only 33.2 percent by the bottom 90 percent of the income distribution. It is the bottom 90 percent of the income distribution that has the greatest propensity to spend marginal changes in income on local goods and services.

It is a remarkable finding that switching more of the tax financing to business-tax financing has positive effects on net benefits, even though business taxes have negative supply-side effects on private job creation. It is surprising that these negative supply-side effects are outweighed by the advantages of tax exporting, which shifts both costs and negative demand-side effects outside the local economy. This finding depends on how sensitive private job creation is to business taxes. In experiments with the model, I find that shifting the tax financing towards business taxes continues to have net benefits until the cost elasticity of businesses is increased in absolute value to −36—that is, that a 1 percent increase in local costs reduces long-run business activity by 36 percent. This is far more than the cost sensitivity implied by the research literature on how local job growth responds to state and local business taxes.

Under the business-tax-financing scenario, the lowest income quintile receives much larger benefits. In the baseline scenario (Panel A), the lowest income quintile loses $15.7 million in net income. In this business-tax-financing scenario in Table 16, Panel C, the lowest income quintile gains $60.8 million. This $60.8 million gain is 12.12 percent of total net benefits of $501.1 million—more than twice this group's baseline income share of 5.08 percent.

Furthermore, under business-tax financing of incentives, net benefits of incentives are less subject to risk from possible low-cost sensitivity of business location decisions, or from funding activity that is not 100 percent export-base, or from lower multipliers. In some further experiments with the model, if we assume 100 percent business-tax financing, net benefits are still positive at a cost sensitivity parameter of −1.5, which is far less cost sensitive than the range of the most plausible estimates found in the research literature. Alternatively, the minimum export-base percentage required for net benefits to be positive is only 40 percent, which is far below the minimum of 89 percent when the baseline scenario's financing assumptions are adopted. Finally, the minimum multiplier required for net benefits to be positive is 1.0—that is, benefits are positive even if the incented firms have zero multiplier effects on creating jobs in other firms. In contrast, as discussed in the multiplier section, with the baseline system of financing, the minimum required multiplier is 2.3.

Economic Benefit-Cost Implications of Local Budget and Economic Structures That Yield Different Fiscal Benefits: Different Marginal Costs of Additional Population

Because incentive financing matters to incentives' benefits and costs, these benefits and costs must also be affected by anything that affects incentives' fiscal benefits. With greater fiscal benefits, incentives will have lower budget costs, which will then have lower opportunity costs for the economy because of negative effects of higher taxes or lower public spending. On the other hand, if fiscal benefits are lower, incentive budget costs will increase, which means more serious negative opportunity costs for the local economy, due to some combination of a greater required increase in state and local taxes and a greater required reduction in state and local public spending.

Consider first the possibility that a given boost to local population may have greater or lesser effects on public spending needs compared to what is assumed under the baseline scenario. The baseline scenario assumes that public spending needs scale with population proportionately: if population goes up by 10 percent, the need for state and local public spending goes up by 10 percent. What if, instead, the marginal costs of more population were 10 percent above average costs? This would imply, for example, that a 10 percent increase in population would increase public spending needs by 11 percent. Such higher marginal costs might occur, for example, if existing public services and infrastructure were already "congested": the public schools were full and at maximum class sizes, the highways and roads already were at capacity, and so on. Alternatively, marginal costs of public services for state and local taxpayers might be above average costs if existing public infrastructure had been paid for using federal grant programs that no longer exist or are funded at a lower level, which means any needed new infrastructure will have higher state and local costs.

Another possibility is that the marginal costs of more population might be below average costs. This might occur, for example, in a state or local economy that had previously declined, but had not fully scaled back its public services and infrastructure to match the decline. In that case, existing public services and infrastructure may be underutilized. Population increases might be accommodated with less than fully proportional increases in public spending needs.

Table 16 considers two alternative scenarios of how marginal public service costs scale with population.

Panel B considers the possibility that marginal costs are 10 percent above average costs. Such higher marginal service costs reduce net economic benefits of incentives to −$95.5 million, compared to the baseline scenario's net benefits of $113.6 million, a reduction of $209.1 million. This decline in net benefits is distributed regressively across the different income quintiles. For example, net benefits for the lowest income quintile in this high marginal cost scenario are −$46.2 million, compared to the baseline-scenario net benefits for this quintile of −$15.7 million, a reduction of $30.5 million. This reduction of $30.5 million is 14.58 percent of the overall decline in net benefits of $209.1 million, which is almost three times this quintile's 5.08 percent share of overall income.

The decline in net benefits due to higher marginal costs is some multiple of the direct effects of higher marginal costs on fiscal benefits and net budget costs. The high marginal cost scenario leads to net budget costs of −$434.3 million, compared to the baseline scenario net budget costs of −$326.9 million, which means net budget costs increase overall by $107.4 million.[108] But, as noted above, the effect on net economic benefits is a reduction of $209.1 million, which is almost twice the direct budget effects. These "multiplier" effects of changes in fiscal benefits and budget costs are mostly due to the opportunity costs of higher budget costs, because of higher budget costs leading to greater education cutbacks. In the high-marginal-cost scenario, the wage loss due to education cutbacks is $258.2 million, compared to $193.9 million in the baseline scenario, so the wage loss increases by $64.3 million. In addition, the increase in budget costs has some demand-side effects in reducing job creation and hence labor market benefits and property value benefits.

These patterns of effects by different types of income explains the regressive effects of higher public-service marginal costs. The two main changes in different types of income due to higher marginal public-service costs—1) higher budget costs and 2) higher education cutbacks—both have regressive effects on the distribution of income. This regressivity is reinforced by the regressive effects of lower labor market benefits. When incentives end up having higher net budget costs, lower income quintiles bear a disproportionate share of both the direct costs and the opportunity costs.

108 This increase in budget costs makes sense. As shown in Table 4, the baseline scenario has additional public service needs whose net present value is $1,286.7 million. A 10 percent increase in this figure is $128.7 million. But some of this will be offset by some of these added costs being exported to out-of-state business owners.

Table 16 How Benefits Vary with Marginal Fiscal Spending Costs

Panel A: Baseline scenario: spending needs expand proportionately with population

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Marginal cost of more population is 10% above average costs

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(95.5)	(46.2)	(21.5)	19.5	(49.1)	1.9
Net local budget costs	(434.3)	(46.2)	(54.3)	(66.6)	(83.4)	(183.9)
Labor market benefits	491.3	57.6	83.8	127.9	65.9	156.2
Property-value benefits	137.8	4.3	6.7	9.0	16.3	101.5
Education cutbacks	(258.2)	(61.2)	(56.9)	(49.7)	(45.8)	(44.5)
Local business effects	(32.1)	(0.7)	(0.7)	(1.1)	(2.1)	(27.5)

Panel C: Marginal cost of more population is 10% below average costs

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	347.0	18.2	48.6	98.4	29.3	152.7
Net local budget costs	(206.5)	(22.0)	(25.8)	(31.7)	(39.6)	(87.4)
Labor market benefits	556.0	65.1	94.8	144.7	74.6	176.8
Property-value benefits	156.6	4.9	7.6	10.3	18.5	115.4
Education cutbacks	(123.1)	(29.2)	(27.1)	(23.7)	(21.8)	(21.2)
Local business effects	(36.0)	(0.8)	(0.8)	(1.3)	(2.3)	(30.8)

NOTE: This table considers effects of assuming that state and local public expenditure needs per added person are more or less than average spending needs, due to either current congested infrastructure and services, or excess capacity.
This directly affects fiscal benefits, and this in turn indirectly affects benefits by affecting the magnitude of required education cutbacks, among other effects.
Quintile income shares are percentages of total income. All other numbers are in millions of 2015 dollars, and are present-value figures. Negative numbers are in parentheses.

What if, instead, marginal costs of more population are less than average costs? Table 16, Panel C, considers a scenario in which the marginal costs of more population are 10 percent less than average costs. The effects, relative to the baseline scenario, are close to but not perfectly symmetrical with the effects of higher marginal costs, but are of opposite sign.[109] With lower marginal costs in Panel C, total net economic benefits are $347.0 million, compared to the baseline scenario's net benefits of $113.6 million, an increase of $233.4 million. These increased benefits are distributed progressively across the various income quintiles. For example, for the lowest income quintile,

109 As with previous results, although these marginal cost assumptions enter the model linearly, they interact in the workings of the model, which yields modestly nonlinear results.

net benefits increase by 14.52 percent of the total gain of $233.4 million (14.52 percent = [$18.2 million in Panel C minus negative $15.7 million in Panel A] / $233.4 million overall gain). Furthermore, the net economic benefits from lower marginal costs are almost twice the direct effects on net budget costs, which go down by $120.4 million (−$120.4 million = $206.5 million of budget costs in Panel C, versus $326.9 million in budget costs in Panel A). Again, this "multiplier" effect on net budget costs is mostly due to the opportunity costs of changes in budgets, which stem from changes in wage losses from education cutbacks. In the low-marginal-cost scenario, wage losses from education cutbacks are $123.1 million, compared to $193.9 million in the baseline scenario, which means wage losses are reduced by $60.8 million.

Economic Benefit-Cost Implications of Local Budget and Economic Structures That Yield Different Fiscal Benefits: Different Responses of State and Local Taxes to Greater Local Employment and Income

Changes in the marginal public spending costs of more population are not the only factor that may affect incentives' fiscal benefits. Fiscal benefits of incentives may also be affected by differences in state and local tax structure.

The baseline scenario assumes an "average" tax structure for state and local taxes, based on all U.S. states. For example, the baseline scenario assumes that 31 percent of tax revenue comes from property taxes and 23 percent each from general sales taxes and personal income taxes. These proportions coming from different taxes can vary greatly across states and over time, as shown in the Census of Governments data that is the basis for the average revenue share figures).

The baseline scenario also assumes an "average" elasticity of different state and local taxes with respect to changes in personal income. For example, the baseline scenario assumes that property taxes have an elasticity with respect to personal income of 0.860, that income taxes have an elasticity with respect to personal income of 1.832, and that sales taxes have an elasticity with respect to personal income of 0.811. These elasticities also differ greatly across states (Anderson and Shimul 2012; Bruce, Fox, and Tuttle 2006).

Under the baseline scenario, the net effect of these assumptions is that state and local revenue is slightly inelastic in response to increases in jobs and income. In the long run, state and local tax revenue goes up in percentage terms by about 99 percent of the model's estimates of the boost to total state and local personal income.[110]

In response to boosts to local employment and income, some state and local tax systems may show greater or lesser responses. State and local tax systems that have a greater reliance on personal income taxes, versus sales taxes or property taxes, will show a greater tax revenue response. A greater tax revenue response will also occur if state and local personal income tax structures are more progressive. Higher state incomes are also likely to lead to more revenue when the sales tax covers more services, whose consumption is more responsive to income boosts.

In Table 17, I consider the implications of a greater or lesser responsiveness of state tax structures to boosts in state personal income. In Panel B, the assumption is that the marginal increase in tax

110 This is the long-run effect on revenues. In the short-run, it is somewhat less. The simple average percent boost to revenue over the entire 80-year period is about 97 percent of the percentage boost to personal income.

Table 17 How Benefits Vary with Marginal Tax Revenue Collection

Panel A: Baseline scenario: state and local tax revenue expands based on average tax rules and rates, which imply long-run percentage expansion of about 99 percent of employment expansion

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Marginal tax collection per job is 10% above what is expected based on average state's tax rules

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	318.1	14.3	44.2	93.2	24.2	142.2
Net local budget costs	(222.5)	(23.7)	(27.8)	(34.1)	(42.7)	(94.2)
Labor market benefits	551.0	64.6	93.9	143.4	73.9	175.2
Property-value benefits	155.0	4.9	7.5	10.2	18.3	114.2
Education cutbacks	(129.6)	(30.7)	(28.6)	(25.0)	(23.0)	(22.3)
Local business effects	(35.8)	(0.8)	(0.8)	(1.3)	(2.3)	(30.6)

Panel C: Marginal tax collection per job is 10% below what is expected based on average state's tax rules

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(71.7)	(43.0)	(17.9)	23.7	(44.9)	10.4
Net local budget costs	(421.2)	(44.8)	(52.6)	(64.6)	(80.8)	(178.3)
Labor market benefits	495.4	58.0	84.5	128.9	66.5	157.5
Property-value benefits	139.1	4.4	6.7	9.1	16.4	102.4
Education cutbacks	(252.6)	(59.9)	(55.7)	(48.7)	(44.8)	(43.5)
Local business effects	(32.3)	(0.7)	(0.7)	(1.1)	(2.1)	(27.7)

NOTE: This table considers the effects of assuming that state and local public tax collections are more or less than average tax collections.

This directly affects fiscal benefits, and this in turn indirectly affects benefits by affecting the magnitude of required education cutbacks, among other effects.

The baseline scenario is based on average state and local tax rules and results in employment expansion yielding revenue per job of 98.8 percent of average revenue per job in the long run.

Alternative scenario in Panel B boosts revenue collection from state and local taxes by 10%—for example, if the state relies on income tax more or has a more progressive income tax, or has greater services coverage of sales tax. Because not all state and local general revenue comes from taxes (some comes from intergovernmental revenue from the federal government), this boosts overall revenue per job, as a percentage of average revenue per job, by a little less than 10%, to 106.6% of average revenue per job.

Panel C reduces revenue collections by 10% compared to baseline, which might occur if the state relies more on sales tax, or has a less-progressive income tax, or a narrower sales-tax base. This lowers marginal revenue collection per job, compared to average revenue, to 91.2%.

Quintile income shares are percentages of total income. All other numbers are in millions of 2015 dollars, and are present-value figures. Negative numbers are in parentheses.

revenue collections in response to boosts in jobs and income is about 10 percent above what would be expected under the baseline scenario. Because not all state and local revenue is tax revenue (some comes from the federal government), the overall boost to state and local revenue from job and income creation goes up by somewhat less than 10 percent, to 106.6 percent of the jobs and income boost, compared to 98.8 percent in the baseline scenario. Panel C assumes that the boost to tax revenue collections is 10 percent less than the baseline, which lowers overall revenue growth to 91.2 percent of the percentage boost to state jobs and incomes.

The qualitative nature of these results is quite similar to the results for spending in Table 16. Changes in marginal-revenue assumptions that boost fiscal benefits and lower net budget costs have both direct budget benefits and some multiplier effects on overall net economic benefits, because of lower education cutbacks, and have a net progressive effect on the income distribution. The opposite is true of changes in marginal-revenue assumptions that lower fiscal benefits and increase net budget costs. The quantitative estimates are similar to but not identical to the results from Table 16 for spending.[111]

For example, in Panel B, with higher marginal-revenue collections, total net benefits are $318.1 million, compared to $113.6 million under the baseline scenario, an increase of $204.5 million. This increase in net economic benefits is primarily due to a reduction in net budget costs of $104.4 million ($222.5 million in budget costs in Panel B, versus $326.9 million in the baseline scenario of Panel A), and secondarily due to a reduction in wage losses from education cutbacks of $64.3 million ($129.6 million in such wage losses in Panel B's higher-marginal-revenue scenario, versus $193.9 million in wage losses due to education cutbacks in Panel A). The increase in net benefits of $204.5 million is progressively distributed. For example, the lowest income quintile receives 14.67 percent of the increase in net benefits in Panel B versus Panel A (14.67 percent = [$14.3 million gain in Panel B versus $15.7 million loss in Panel A] / total net gain of $204.5 million).

Based on these results, the fiscal effects of incentives need to be taken seriously. In the alternative scenarios of Tables 16 and 17, I have only considered moderate changes in spending and revenue effects of job growth and population growth. In the real world, one can imagine scenarios in which the marginal spending effects or revenue effects differ more dramatically, with, consequently, more dramatic effects on incentives' net benefits and distributional effects.

111 These different marginal-revenue scenarios are made simpler by merely altering the assumed marginal-revenue collections and no other features of the model. A more realistic but more complicated scenario would also alter the distributional assumptions of the model to account for variations in the share of revenue from different revenue sources, and the progressivity of different types of revenue sources. It would be possible to estimate a different scenario for each of the 50 states based on their different revenue structures.

ALTERNATIVE SCENARIOS, GROUP 3: ALTERNATIVES VARYING IN WHO GETS THE JOBS

In this group of alternative scenarios, I consider how the economic benefits and costs of incentives are affected by who gets the jobs. Holding constant how sensitive incented firms and the economy are in creating jobs in response to incentives, and holding constant how incentives are designed and financed, I consider how incentive benefits are altered if either public policy or the local economic environment leads to a greater or lesser share of the new jobs going to the local nonemployed, as opposed to in-migrants.

Why does it matter who gets the jobs? As explained above, ultimately new jobs created in a local economy must either increase the employment-to-population ratio or the local population, or both in some combination. That is, new jobs ultimately either result in new jobs for local residents who otherwise would be nonemployed, or new jobs for in-migrants, or some share of each. (As stated earlier, if some of the new jobs go to employed local residents, this creates a vacancy, and this vacancy chain ends only when a job vacancy is filled by either a nonemployed local resident or an in-migrant.)

If more of the created jobs go to local residents who otherwise would not be employed, this directly increases incentives' labor market benefits. Local earnings go up more because of the greater increase in the local employment-to-population ratio. In addition, if new jobs lead to a greater increase in the employment-to-population ratio, this tends to increase fiscal benefits, as state and local tax revenue will tend to increase with employment, and state and local public spending needs will tend to increase with population. With higher fiscal benefits, cutbacks in education spending will be reduced, and this will, after some lag, increase local residents' wages.

In addition to increasing overall benefits, more jobs for nonemployed local residents would be expected to affect the local income distribution progressively. A higher employment-to-population ratio will tend to particularly help income quintiles that have more nonemployed, and empirical work shows that such benefits are particularly strong for the bottom three income quintiles relative to the top two income quintiles. Greater fiscal benefits and less education cutbacks will also particularly help the lowest income quintiles, who tend to bear more than their share of state and local taxes, and bear more of the brunt of public education cuts.

In this section, I first consider increasing the share of jobs going to the local nonemployed through the use of local labor market policies, such as job training policies and job matching policies. I then consider how the share of jobs going to the local nonemployed is affected by the local economic environment, in particular the local unemployment rate, and what implication this has for public policy toward incentives.

Targeting More Jobs for the Local Nonemployed through Larger and Higher-Quality Local Job Training and Labor Market Intermediary Policies

In the baseline scenario, the initial local unemployment rate is 6.2 percent. This unemployment rate converges at 10 percent per year toward a long-run unemployment rate of 4.5 percent.

Based on the research literature on how labor demand shocks affect labor force participation, the baseline scenario assumes that, initially, 232 of every 1,000 new jobs go to local residents who otherwise would be out of the labor force. Over time, this labor force participation rate effect gets lower because of the unemployment rate converging to a lower rate, and because of labor-force-participation-rate effects of an employment shock depreciating due to out-migration, aging, and death. In the baseline scenario, the ratio of additional labor force participants to new jobs goes from 0.232 at Year 1 to 0.150 at Year 10 to 0.094 at Year 20.

In Table 18, Panel B, I consider the impact of job training policies or labor market intermediary policies that would somehow significantly increase the share of jobs going to local residents who otherwise would not be in the labor force. (More below on what these policies might be). Specifically, Panel B considers the following scenario: at the initial 6.2 percent unemployment, out of every 1,000 jobs created, 332 go to local residents who otherwise would not be in the labor force, 100 more than the baseline scenario assumption of 232. This also implies that out of every 1,000 jobs created, 100 fewer go to in-migrants. Over time, this labor-force-participation-rate effect decreases because of depreciation and lower unemployment, but it stays proportionately higher than in the baseline scenario. In this alternative scenario, at Year 10, the ratio of increased local

Table 18 Increasing the Percentage of Jobs That Go to Local Nonemployed by 10 Percentage Points

Panel A: Baseline scenario: Percentage of jobs that increase local labor force participation is initially 23.2 percent.

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Percentage of jobs going to local residents increases initially by 10 percentage points

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	317.7	11.2	46.1	103.7	18.7	138.0
Net local budget costs	(290.4)	(30.9)	(36.3)	(44.5)	(55.7)	(123.0)
Labor market benefits	658.2	77.1	112.2	171.3	88.3	209.3
Property-value benefits	148.9	4.7	7.2	9.8	17.6	109.6
Education cutbacks	(164.4)	(39.0)	(36.3)	(31.7)	(29.2)	(28.3)
Local business effects	(34.6)	(0.7)	(0.8)	(1.2)	(2.2)	(29.6)

NOTE: This alters the baseline scenario to consider more jobs going to local nonemployed.
Baseline scenario estimates labor-force-participation-rate effects of job shock based on prevailing local unemployment rate.
This alternative keeps all of the same baseline assumptions, including the baseline unemployment scenario, but assumes that public policies restructure the local labor market so that the share of jobs to local nonemployed increases by 10 percentage points.
This is done by increasing the initial labor-force-participation-rate effect from 0.232 to 0.332—that is, initially 33 percent of new jobs go to non-labor-force participants, not 23 percent. This effect then ratchets down as unemployment goes down and the labor force participation rate depreciates, but it stays proportionately higher over time.
Quintile income shares are percentages of total income. All other numbers are in millions of 2015 dollars, and are present-value figures. Negative numbers are in parentheses.

labor force participants to new jobs is 0.215, and the ratio is 0.135 at Year 20. This is the same proportional increase in the share of jobs going to local residents who are out of the labor force: the initial 332 out of 1,000 under this Panel B scenario is 43 percent greater than the baseline scenario (1.43 = 332/232), and the share going to local residents at Year 10 or Year 20 is also higher by about 43 percent (1.43 = 0.215 / 0.150 = 0.135 / 0.094).

Under this alternative scenario, as expected, net benefits significantly increase because of higher labor market benefits and fiscal benefits and reduced education cutbacks. In Panel B, net economic benefits are $317.7 million, compared to the baseline simulation of $113.6 million, an increase of $204.1 million. Of this increase of $204.1 million, about two-thirds is due to greater labor market benefits. Labor market benefits increase to $658.2 million, compared to the baseline simulation of $521.7 million, a boost of $136.5 million. But net budget costs are also reduced, as a result of lower population growth. Net budget costs under this alternative scenario are $290.4 million, compared to $326.9 million under the baseline scenario, a reduction of $36.5 million. As a result, wage losses from cuts in K–12 education spending under this alternative scenario are $164.4 million, compared to $193.9 million under the baseline scenario, a reduction of $29.5 million.

Furthermore, these increased net benefits are distributed progressively. The bottom three quintiles gain more than their baseline income shares, and the top two income quintiles gain less than their baseline income shares. For example, of the total gain in net benefits from Panel A to Panel B of $204.1, $26.9 million goes to the lowest income quintile, or 13.19 percent of the total gain—more than twice the lowest income quintile's baseline income share of 5.08 percent.

What policies could affect the share of new jobs that go to local residents who otherwise would not be employed? In part, the share of new jobs to local nonemployed residents can be affected by incentive policies that encourage incented firms to consider the local nonemployed for job openings. Some cities (e.g., Portland, Oregon, and Berkeley, California) have at times adopted "First Source" requirements, under which firms receiving incentives are asked to sign an agreement to consider referrals from the local job training system as a "first source" for entry-level new hires (Bartik 2001; Schrock 2015). If such requirements are accompanied by a well-designed local job-training system that does an effective job of training and screening nonemployed local residents for entry-level jobs, such policies may affect who is hired for a portion of the new jobs created.

But to have a large and persistent effect on local employment rates, policymakers must go beyond just affecting the hiring behavior of incented firms; they must also consider how local job training and labor market intermediary policies can affect the hiring decisions of all local firms. Obviously, we would want to affect the hiring decisions involving the multiplier jobs in local suppliers and local retailers—that is, jobs whose creation is attributable to any directly induced jobs in incented firms. But it should also be recognized that who gets the jobs is affected by who is hired along the entire chain of job vacancies. To some extent, incented jobs and multiplier jobs will be filled by hiring local residents who already have jobs in other local firms, which means this job creation leads to the creation of job vacancies in other firms. How these job vacancies throughout the local economy are filled will have a major effect on who ultimately gains new job opportunities from local job creation.

Therefore, to have large and persistent effects on who is hired to fill either newly created jobs or the resulting job vacancies, the local job training and labor market intermediary system must be of sufficient scale and quality to alter how a wide range of local firms find it best to do their hiring. If a local job training system can provide a high-quality combination of job training, screening of job applicants, and posthiring support of new hires from the local nonemployed, and do so at a large scale, local firms might find it more productive and more profitable to use this system. As a result, the local nonemployed will be more likely to fill any job vacancy, whether it is in the new jobs created or the resulting vacancies.

Incentive Impacts in Economies with Higher or Lower Unemployment

As mentioned, the baseline scenario assumed an initial 6.2 percent state-and-local unemployment rate, converging toward 4.5 percent unemployment over time. If the unemployment rate is higher, more jobs will go to the local nonemployed, and if the unemployment rate is lower, fewer jobs will go to the local nonemployed. More jobs for the local nonemployed will increase incentives' labor market benefits, as well as increasing fiscal benefits and reducing the magnitude of required education cutbacks. Given this pattern of expected effects, we would anticipate that the distribution of benefits will be more progressive. The reverse is true if initial unemployment is lower. How large are these effects, for different real-world scenarios for an area's unemployment rate?

I focus on what I regard as the most realistic scenarios, in which we consider a different initial local unemployment rate, but an unemployment rate that converges over time to some long-run equilibrium unemployment rate. In most states and local economies facing high unemployment or low unemployment, this is a temporary situation, which will eventually resolve itself due to changes in job creation, labor force participation, and migration. Therefore, I continue the model's assumption that the initial unemployment rate converges at 10 percent per year toward long-run unemployment of 4.5 percent. At 10 percent annual convergence, unemployment rates significantly above or below 4.5 percent can persist for some time, but the local economy will eventually get back to "full employment."

Table 19, Panel B, considers a temporarily high unemployment-rate scenario: the prevailing unemployment rate is initially high at 10 percent but converges at 10 percent per year toward a long-run equilibrium of 4.5 percent. This high-unemployment scenario significantly boosts net benefits: with high unemployment, net benefits are $288.2 million, compared to $113.6 million in the baseline scenario, an increase of $174.6 million. As expected, most of the increase is due to higher labor market benefits, but there also are benefit increases due to lower budget costs and lower wage losses from education cutbacks. Also, as expected, in the high-unemployment scenario, the distribution of net benefits from incentives becomes more progressive. Comparing Panel B to Panel A, the gains for the bottom three income quintiles exceed their baseline income shares, whereas the gains for the top two income quintiles are less than their income shares. For example, if we subtract Panel A from Panel B, the bottom income quintile gains 13.53 percent of the total net income gain over all income quintiles (13.53 percent = [7.9 minus −15.7] / 174.6), which is over twice this quintile's baseline income share of 5.08 percent. The top income quintile gains 32.36 percent of the total net income gain (32.36 percent = [129.5 minus 73.0] / 174.6), which is over a third below this quintile's baseline income share of 51.96 percent.

Table 19 Different Local Unemployment Rate Scenarios

Panel A: Baseline scenario: Initial 6.2% unemployment rate, converging at 10% per year to 4.5% unemployment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Initial 10% unemployment, converging at 10% per year to 4.5% unemployment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	288.2	7.9	40.8	95.0	15.1	129.5
Net local budget costs	(286.5)	(30.5)	(35.8)	(43.9)	(55.0)	(121.3)
Labor market benefits	620.0	72.6	105.7	161.4	83.2	197.1
Property-value benefits	150.3	4.7	7.3	9.9	17.7	110.7
Education cutbacks	(161.5)	(38.3)	(35.6)	(31.1)	(28.7)	(27.8)
Local business effects	(34.1)	(0.7)	(0.8)	(1.2)	(2.2)	(29.2)

Panel C: Initial 3% unemployment, converging at 10% per year to 4.5% unemployment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(16.0)	(33.3)	(10.0)	28.3	(32.2)	31.0
Net local budget costs	(356.7)	(38.0)	(44.6)	(54.7)	(68.5)	(151.0)
Labor market benefits	448.5	52.5	76.5	116.7	60.2	142.6
Property-value benefits	143.9	4.5	7.0	9.4	17.0	106.0
Education cutbacks	(217.9)	(51.7)	(48.0)	(42.0)	(38.7)	(37.5)
Local business effects	(33.8)	(0.7)	(0.8)	(1.2)	(2.2)	(28.9)

NOTE: These scenarios differ solely from the baseline scenario by considering different local unemployment-rate baselines over the 80-year period of the simulation.
Quintile income shares are percentages of total income. All other numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.

What about the implications of low unemployment for the benefits of incentives? In Panel C, I consider a state or local area that initially has 3 percent unemployment, with that unemployment gradually converging over time to 4.5 percent unemployment. This could well be accurate for many booming regions with healthy job growth. Under this scenario, total net benefits become negative at −$16 million. As expected, this is mainly due to lower labor market benefits, and secondarily due to higher net budget costs and higher wage losses from education cutbacks. The distribution of benefits also becomes more regressive.

What implications do these results have for policymakers? Policymakers cannot choose what unemployment rate they face, but they can choose how they respond to it. These results suggest economic development incentive policy can be justified in being more aggressive if the local unemployment rate is higher than normal, and if this situation is expected to be reasonably persistent. Therefore, states should be more aggressive in offering incentives at times when unemployment is high. In addition, states might be justified in being more aggressive in offering incentives in local labor market areas that have high unemployment.

In contrast, incentives are less justified at times when states have low unemployment or in low-unemployment areas of states. In low-unemployment states or local labor markets, incentives have lower net benefits, and they have regressive effects on the local income distribution.

ALTERNATIVE SCENARIOS, GROUP 4: CAN AN INCENTIVE STRATEGY WORK THAT FOCUSES ON LOCALLY OWNED FIRMS, AND UNDER WHAT ASSUMPTIONS?

This next group of scenarios is different. Previously, the alternative scenarios that were examined explored how incentives' net benefits varied with one or at most two tweaks to economic assumptions or policy design. In this group of scenarios, I instead focus on exploring whether an entirely different approach to incentive policy can be made to work. Rather than comparing this approach to incentive policy with the baseline, I instead focus on how this alternative approach's benefits vary as it is modified in various ways.

The alternative incentive policy considered in this section focuses incentives on locally owned firms. A local focus to economic development policy has many advocates, although not necessarily powerful advocates. Many cities have "buy local" organizations that encourage local consumers to buy from locally owned stores. Some national groups have focused on researching and advocating for economic development strategies that target locally owned firms, including the Institute for Local Self-Reliance (ILSR) and the Business Alliance for Local Living Economies (BALLE). Several books have been written about this approach, including Michael Shuman's various books such as The Local Economy Solution (2015) and ILSR researcher Stacy Mitchell's Big Box Swindle: The True Cost of Mega-Retailers and the Fight for America's Independent Businesses (2007).

Most economists instinctively recoil against economic strategies focused on local businesses. A local economic strategy may give the impression that it wishes to forgo trade with other local areas, even if the strategy does not involve any trade restrictions. By long tradition, the economics profession is committed to the proposition that more extensive free trade is, overall, a good thing. In the past, in talking about incentives, I made some dismissive remarks about focusing on local firms, arguing that a "greater reliance on local . . . production would significantly reduce an area's real per capita income . . . [because] there are static and dynamic gains from trade" (Bartik 2005).

In this section, I want to take the local approach more seriously. What would it take for a focus of incentive policy on locally owned firms to make sense economically? What conditions would have to be met, and are those conditions achievable by real-world economic development policies?

Focusing on locally owned businesses has both advantages and disadvantages. On the advantages side, there is some empirical evidence that locally owned businesses are more likely to use local suppliers. In my model, the assumed extra local multiplier is 0.25, based on research by Civic Economics (2007, 2013).[112] That is, a locally owned firm, compared to an otherwise similar nonlocally owned firm, is assumed to rely on local suppliers for an extra 25 percent of its value-added. As a result, labor market benefits and other effects of encouraging firm growth will increase.

Second, and more importantly, as the model counts all local boosts to income, the incentive payments themselves are now largely a transfer payment from general taxpayers to the owners of these local businesses. There is thus a big additional benefit for local businesses, which is added to the local business effects of incentives. This benefit directly adds to overall local income. This

112 Obviously, one would prefer that the extra local ownership multiplier be backed by more extensive research, and some peer-reviewed research. However, the assumption of an extra 0.25 multiplier seems quite modest and reasonable.

addition to local business income also has further multiplier effects on local labor market incomes, by increasing local demand for goods and services by the now-wealthier local business owners.[113]

Third, the many locally oriented businesses that are small are better candidates than many large, outsider-owned businesses for some of the potentially "efficient" customized services, such as customized job training, manufacturing extension services, or small business development centers. Such "customized service" incentives are said to be "cost-efficient" if they have larger effects on firms' job-creation behavior, per dollar of budget cost, than is true of tax and other cash incentives. Small and medium-sized locally owned businesses may benefit considerably from customized services that provide information or training that they find difficult to provide or find on their own. In contrast, nonlocally owned businesses, which tend to be much larger, either may be better able to provide these services from their own employees or may have already identified reliable outside-service vendors. If these customized services are well run, the value of these services to assisted businesses may considerably exceed these services' costs. As a result, per dollar of incentive costs, delivering customized services to locally owned businesses may have larger effects on incented firms' start-up or expansion decisions than is true of tax and other cash incentives for these firms, or for larger nonlocally owned firms. In addition, if such customized services truly lower costs, increase sales, or otherwise increase profits by more than a dollar per dollar of costs, these extra profits to locally owned businesses are counted as a benefit in this model, since such profits accrue to local residents.

A local-ownership focus to incentives also has disadvantages. First, many locally owned businesses may be smaller businesses that are less likely to be export-base. Many locally owned businesses may lack the knowledge, resources, or networks needed to effectively market their goods and services outside the local economy. If a locally owned business is non-export-base, then even if incentives encourage this locally owned business to expand, its expansion will reduce sales of competing local businesses who sell similar goods and services locally. As a result, any job creation in the incented business will to some extent displace jobs from other businesses located in the area.

Despite this job displacement that occurs if the locally owned business is non-export-base, encouraging the expansion of locally oriented businesses may still have some remaining multiplier effects. The displaced jobs in other competing businesses located in the local area may be in businesses owned by outsiders. Substituting production of locally owned businesses for production of nonlocally owned businesses may still stimulate the local economy, if this substitution leads to more purchases in this locally oriented industry from local suppliers.[114] However, the net multiplier effect of locally owned businesses that are non-export-base will still be considerably lower than for locally oriented businesses that are export-base.

113 The amount added to local demand from higher income for local business owners will depend upon how the higher income for local business owners is distributed across the income distribution. Based on Zidar (2017), the model assumes that only increases in net income for the bottom 90 percent of the income distribution add to local demand for goods and services. In some of the simulations below, I explore how results differ depending upon where the assisted business owners fall in the income distribution.

114 Of course, some of the displaced production may also be in locally owned businesses. In the model, I assume that when a locally owned business displaces other businesses in the local area that sell to the same local market, 25 percent of the displaced business activity and jobs are in locally owned businesses, and the other 75 percent are in businesses situated in the local area but owned by outsiders.

Second, local owners of businesses, like all business owners, probably tend to come disproportionately from higher-income groups. Therefore, some benefits from incentives to local business owners will enhance the income of upper-income groups. Because incentives are financed by either higher state and local taxes or lower state and local public spending, both of which tend to disproportionately reduce the real incomes of lower-income groups, there is the potential for incentives to local business owners to make the local income distribution more regressive.

The following scenarios consider incentives to locally owned businesses under various assumptions. Can such incentives be cost-effective even if the locally owned businesses are non-export-base? How efficient must customized services be for customized services to locally owned businesses to have a net payoff for local economies? Can incentives for locally owned businesses promote greater equity in the local income distribution, even if these incentives are paid for in ways that disproportionately burden lower-income groups?

Local Ownership's Implications: Export-Base and Non-Export-Base

Table 20, Panel B, presents a scenario that changes the baseline scenario in only one respect: the incented firms are assumed to be locally owned. Net benefits overall greatly increase, to $647.0 million, compared to $113.6 million in the baseline scenario, an increase of $533.4 million.

As expected, this is largely due to local business effects switching from somewhat negative, because of higher costs, to highly positive, because of the income benefits for local business owners from receiving incentive payments. In the local ownership scenario, net benefits for local businesses are $370.0 million, compared to −$33.9 million in the baseline scenario, an increase of $403.9 million.

But the model also shows an increase in labor market benefits of $79.5 million ($601.2 million in the new scenario versus $521.7 million in the baseline), an increase in property value benefits of $21.9 million ($168.5 million in the new scenario versus the baseline of $146.6 million), a reduction in net local budget costs of $15.4 million ($311.4 million in the new scenario versus the baseline of $326.9 million), and a reduction in wage losses from education cutbacks of $12.6 million ($181.3 million in such losses in the new scenario versus $193.9 million in the baseline). Local firms have an extra multiplier because of spending on local suppliers, and, in addition, local owners are assumed to spend some of their incentive payments on local goods and services.

The bulk of this increase in net income benefits accrues to the highest-income quintile, as the ownership of local businesses is assumed to be concentrated in this income group. Out of the total net income increase of $533.4 million, the highest-income quintile received $396.1 million ($469.0 million under the local ownership scenario, compared to $73.0 million under the baseline scenario with outside ownership). This $396.1 million is 74.26 percent of the total increase in net benefits, significantly above the upper-income quintile's baseline income share of 51.96 percent. But because of the extra multiplier effects, there is some increase in local labor market benefits that helps other income groups and makes net benefits positive for all the income quintiles.

However, locally owned businesses may be more likely to sell to a local market rather than be export-base. Panel C considers a scenario in which we combine local ownership with the assumption that the locally owned firms are zero percent export-base.

Table 20 Targeting Locally Owned Firms

Panel A: Baseline scenario: Nonlocally owned firms

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Locally owned firms that are still export-base firms

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	647.0	7.5	40.1	97.8	32.5	469.0
Net local budget costs	(311.4)	(33.1)	(38.9)	(47.7)	(59.8)	(131.9)
Labor market benefits	601.2	70.4	102.5	156.5	80.7	191.1
Property-value benefits	168.5	5.3	8.2	11.0	19.9	124.1
Education cutbacks	(181.3)	(43.0)	(40.0)	(34.9)	(32.2)	(31.2)
Local business effects	370.0	7.9	8.4	13.0	23.9	316.9

Panel C: Locally owned firms that are zero percent export-base firms

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(388.9)	(113.2)	(119.6)	(124.8)	(118.2)	86.9
Net local budget costs	(437.6)	(46.6)	(54.7)	(67.1)	(84.0)	(185.3)
Labor market benefits	(62.2)	(7.3)	(10.6)	(16.2)	(8.3)	(19.8)
Property-value benefits	(17.2)	(0.5)	(0.8)	(1.1)	(2.0)	(12.7)
Education cutbacks	(284.8)	(67.5)	(62.8)	(54.9)	(50.5)	(49.0)
Local business effects	412.9	8.8	9.3	14.5	26.7	353.6

Panel D: Nonlocally owned firms that are zero percent export-base firms

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(896.6)	(133.4)	(144.1)	(160.4)	(159.0)	(299.7)
Net local budget costs	(449.9)	(47.9)	(56.2)	(69.0)	(86.4)	(190.5)
Labor market benefits	(125.3)	(14.7)	(21.4)	(32.6)	(16.8)	(39.8)
Property-value benefits	(34.5)	(1.1)	(1.7)	(2.3)	(4.1)	(25.4)
Education cutbacks	(294.8)	(69.9)	(65.0)	(56.8)	(52.3)	(50.8)
Local business effects	7.9	0.2	0.2	0.3	0.5	6.8

NOTE: Quintile income shares are percentages of total income. All other numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.
Baseline scenario in Panel A assumes firm is nonlocally owned and is 100% export-base.
Panels B and C assume that firms receiving incentives are locally owned. The two panels differ in whether these locally owned firms are assumed to be 100% export-base or zero percent export-base.
38% export-base is the tipping point that flips total net benefits for locally owned firms from negative to positive as exports go from 37% to 38%.
Panel D is done for the sake of comparison with Panel C and shows net benefits for nonlocally owned firms that are zero percent export base.

In this case, incentives overall have negative net benefits. However, the negative benefits are less than the overall cost of the incentives at $508.5 million. The incentive costs are to some extent offset by the benefits of the incentives for local business owners. In addition, even though local labor market benefits are on net negative because of the negative demand-side and supply-side effects of raising taxes and cutting spending to finance incentives, the negative labor market effects are somewhat reduced by the local spending induced by helping locally owned businesses. This can be seen if we compare incentives to locally owned nonexport businesses (Panel C) with incentives to nonexport businesses that are nonlocally owned (Panel D).

Some experimentation with the model suggests that net overall benefits switch from negative to positive when the export-base percentage for locally owned firms goes from 37 percent to 38 percent. Therefore, a strategy of targeting locally owned firms can pay off in overall income benefits for a local economy even if only a modest proportion of the assisted firms are export-base.

Combining Efficient Economic Development Services with the Targeting of Locally Owned Non-Export-Base Firms

As mentioned above, efficient economic development services are likely to be of particular usefulness to small and medium-sized firms, who face the greater information and financing barriers to becoming more productive and profitable. In addition to customized job training and manufacturing extension, services such as entrepreneurial training, small business development centers, and business incubators offer potential opportunities for providing business services whose value may significantly exceed the budget costs of providing such services.

However, many such small and medium-sized firms may be non-export-base firms, as well as being locally owned. Can such services to locally owned non-export-base businesses pay off, if the services are sufficiently cost-effective?

Table 21, Panel B, explores an alternative that incorporates three variations from the baseline scenario: 1) the incented firms are locally owned; 2) the incented firms are non-export-base; and 3) the incentives are provided in the form of customized services whose value to the incented firm, and whose effect on the incented firms' job-creation decisions, is 10 times what would be expected based on the incentives' budget costs. The alternative is compared with Panel C from Table 20: a locally oriented firm that is non-export-base, and that is provided with some incentive (a cash or other tax incentive, or an equivalent-value service) whose value and effect on the incented firm is just equal to its budget costs.

As shown in Table 21, Panel B, even if the locally owned firms are non-export-base, providing incentives in the form of highly efficient services has extremely high net benefits. Net benefits go up to $2,483.9 million, compared to −$388.9 million when we provided locally owned non-export-base firms with cash-equivalent incentives, an increase of $2,872.8 million. Most of this net increase is due to greater benefits for local business owners, who gain because of the extra profits provided by incentives whose value is 10 times their costs. Net benefits for local businesses increase to $2,734.5 million in the Panel B scenario, compared to $412.9 million in the Panel A scenario, an increase of $2,321.6 million. However, labor market benefits also go up, to $276.2 million in the Panel B scenario, compared to −$62.2 million in the Panel A scenario, an increase of $338.4 million. The expansion of locally owned businesses, even though they substitute for other

Table 21 Benefits Overall and for Different Income Groups of Efficient Economic Development Services Targeted at Non-Export-Base Businesses with Local Owners

Panel A: Locally-owned firm, zero export-base (Panel C from Table 21), incentives have 1-for-1 efficiency

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(388.9)	(113.2)	(119.6)	(124.8)	(118.2)	86.9
Net local budget costs	(437.6)	(46.6)	(54.7)	(67.1)	(84.0)	(185.3)
Labor market benefits	(62.2)	(7.3)	(10.6)	(16.2)	(8.3)	(19.8)
Property-value benefits	(17.2)	(0.5)	(0.8)	(1.1)	(2.0)	(12.7)
Education cutbacks	(284.8)	(67.5)	(62.8)	(54.9)	(50.5)	(49.0)
Local business effects	412.9	8.8	9.3	14.5	26.7	353.6

Panel B: Higher incentive effectiveness at 10 to 1, locally owned firm, zero percent export base

		Quintile				
Income Distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	2,483.9	(1.5)	15.3	71.2	110.4	2,288.4
Net local budget costs	(371.4)	(39.5)	(46.4)	(56.9)	(71.3)	(157.3)
Labor market benefits	276.2	32.4	47.1	71.9	37.0	87.8
Property-value benefits	75.4	2.4	3.6	4.9	8.9	55.5
Education cutbacks	(230.8)	(54.7)	(50.9)	(44.5)	(40.9)	(39.7)
Local business effects	2,734.5	58.0	61.9	95.8	176.7	2,342.1

NOTE: Panel A is same as Panel C in the previous table: locally owned firm, zero percent export-base, incentives have "normal" effectiveness.
Panel B changes one assumption: the incentives are assumed to have an effectiveness of 10 times their dollar cost.
Some empirical evidence suggests that this might occur for some customized services, such as customized job training and manufacturing extension.
Experimentation suggests that net benefits occur when incentive effectiveness increases from 1.8 to 1.9.
Quintile income shares are percentages of total income. All other numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.

businesses located in the local area, leads to more business for local suppliers, and to more overall local demand because of the extra business income generated.

However, the income distribution of the benefits from such efficient services to locally owned, non-export-base firms is highly skewed, with most of the benefits going to the top income quintile. A considerable portion of such services are redistributing tax dollars from taxpayers across the income distribution to local business owners, who tend disproportionately to come from the upper-income brackets. For example, in the Panel B scenario, even though net benefits are quite high at $2,483.9 million, the lowest income quintile suffers a net loss. Quintiles 2 through 4 do get net benefits, but far less than their baseline shares of overall income. Out of the total $2,483.9 million in net benefits, $2,288.4 million goes to the highest-income quintile, 92.13 percent of the total, about four-fifths greater than the baseline income share of the upper-income quintile of 51.96 percent.

Two questions might be asked about these results. First, we might consider a 10-to-1 efficiency ratio for customized services to firms to be a somewhat extreme assumption, even though it is supported by some research. Some experimentation shows that net benefits occur when we increase from a 1.8 effectiveness ratio to 1.9, so services do not need to be as effective as 10-to-1 for there to be net benefits. But I will explore this further in a later section.

Second, one might be concerned about the income distribution benefits being so highly skewed. I turn to this subject in the next section.

Reducing the Regressivity of Incentive Services to Locally Owned Firms

In my analysis so far of incentives to locally owned firms, I have assumed that incentives are awarded to different income groups in proportion to their share of capital income. These capital income shares are based on data from the Congressional Budget Office. They are highly skewed toward upper-income groups. The shares of capital income by income quintile, and hence the assumed share of incentives to local business owners by income quintile, are as follows: 86 percent to the highest-income quintile, 6 percent to the next-highest-income quintile, 3 percent to the middle-income quintile, and 2 percent each to the two lowest income quintiles. In fact, 78.9 percent of capital income, and hence local business ownership under these assumptions, goes to the top 10 percent of the income distribution.

This assumption, that incentives to local business owners are skewed to upper-income groups, has two important consequences. The first and most obvious is that any gains in profits from these incentives are also skewed to upper-income groups. The second is that this reduces the effects that increased income for local business owners will have on the rest of the local economy through demand effects. In the model, based on research by Zidar (2017), increased local income to the top 10 percent of the income distribution is assumed to have negligible effects on demand for local goods and services, whereas increased local income to the bottom 90 percent of the income distribution has sizable effects on increasing demand for local goods and services. This pattern reflects empirically how local economies and local jobs seem to respond to income shocks for different income groups brought about by changes in federal taxes. Presumably this pattern reflects the notion that for very-high-income groups, overall consumption, and particularly consumption of local goods and services, is not very sensitive to changes in income.

However, which local business owners are aided by incentives is a policy choice. Services to locally owned small and medium-sized businesses could be targeted at residents of low-income neighborhoods, or female or minority business owners, or even owners of more moderate income. These policy measures might reduce the regressive implications of having general taxpayers pay for services to local business owners.[115]

In Table 22, Panel B, I consider the implications of modest income-targeting of customized services to locally owned businesses. In Panel A, which is identical to Panel B of Table 21, I present results from the original, untargeted distribution of services to locally owned businesses: 78.9 percent go to the top 10 percent of the income distribution. But in Panel B, I assume such services are targeted so that the top 10 percent of the income distribution only receives 10 percent of the services. The previous analysis assumed that the top 10 percent received 78.9 percent. The remaining 68.9 percent of the incentives are redistributed among other groups according to their baseline capital income, based on CBO. After this redistribution, the distribution of customized services to locally owned businesses by income quintile is as follows: Quintile 1 (lowest income), 9.05 percent; Quintile 2, 9.64 percent; Quintile 3, 14.93 percent; Quintile 4, 27.54 percent; Quintile 5 (highest income), 38.83 percent. This assumed new distribution represents what I would argue are

115 Alternatively, one could make up for this regressivity by financing such incentive services to local business owners with a progressive income tax.

Table 22 Implications of Restricting Customized Services to Locally Owned Firms Owned by the Top 10 Percent of Income Distribution

Panel A: (= Panel B of Table 21): Locally owned nonexport firms, with efficient services, and with assistance distributed with capital ownership.

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	2,483.9	(1.5)	15.3	71.2	110.4	2,288.4
Net local budget costs	(371.4)	(39.5)	(46.4)	(56.9)	(71.3)	(157.3)
Labor market benefits	276.2	32.4	47.1	71.9	37.0	87.8
Property-value benefits	75.4	2.4	3.6	4.9	8.9	55.5
Education cutbacks	(230.8)	(54.7)	(50.9)	(44.5)	(40.9)	(39.7)
Local business effects	2,734.5	58.0	61.9	95.8	176.7	2,342.1

Panel B: Assume that the top 10% of income distribution is restricted to 10% of local business assistance

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	2,961.4	245.7	292.8	488.9	760.7	1,173.4
Net local budget costs	(307.8)	(32.8)	(38.5)	(47.2)	(59.1)	(130.3)
Labor market benefits	579.6	67.9	98.8	150.8	77.8	184.3
Property-value benefits	153.4	4.8	7.4	10.1	18.1	113.0
Education cutbacks	(179.5)	(42.6)	(39.6)	(34.6)	(31.8)	(30.9)
Local business effects	2,715.7	248.3	264.6	409.7	755.7	1,037.3

NOTE: In Panel A, the efficient services to locally owned non-export-base firms are distributed the same as capital ownership.
In Panel B, the assumption is added that local incentive assistance is restricted so that no more than 10% goes to the top 10% of the income distribution.
The default in Panel A reflects capital ownership numbers from CBO and has 78.9% of local incentive assistance going to the top 10% of the income distribution.
With this restriction, the extra 68.9% of incentive assistance is divided among the remaining 90% of the income distribution according to their default shares, which is based on capital income distribution statistics from CBO.
After restricting the top 10% to 10% of assistance, the resulting share of incentive assistance by income quintile is as follows:
Q1(lowest income), 9.05%; Q2, 9.64%; Q3, 14.93%; Q4, 27.54%; Q5 (highest income), 38.83%.
In Panel B, the minimum effectiveness-to-cost ratio to get net benefits is 1.7.
Quintile income shares are percentages of total income. All other numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.

moderate and feasible redistributions, of which local business owners receive customized business assistance services. Presumably, an incentives policy could go even further in reducing the regressiveness of assistance to local business owners. However, I suspect that even with vigorous efforts, most programs will end up with some increase in the probability of receiving assistance with higher income.

As shown in Panel B of Table 22, targeting more assistance to local business owners in the bottom 90 percent of the income distribution has large effects, not only on incentive effects on the income distribution but on incentives' net benefits. In the Panel B targeted scenario, overall net benefits are $2,961.4 million, compared to $2,483.9 million in the Panel A untargeted scenario, an increase of $477.6 million. Of this increase in overall net benefits of $477.6 million, most is due to greater labor market benefits. Labor market benefits increase by $303.4 million ($579.6 million in the targeted Panel B scenario versus $276.2 million in the untargeted Panel A scenario). As discussed above, these increased labor market benefits are attributable to assistance to local business owners having much greater effects on demand for goods and services when a greater share of such assistance goes to local business owners in the bottom 90 percent of the income distribution, compared to the top 10 percent.

Because of these much greater labor market benefits, which are due to greater local job creation, employment-to-population ratios increase more, which increases fiscal benefits. Net local budget costs are reduced by $63.7 million ($307.8 million in budget costs in the Panel B targeted scenario, versus $371.4 million in such costs in the untargeted Panel A scenario). Furthermore, as a result, wage losses from education cutbacks are significantly reduced. In the Panel B targeted assistance scenario, wage losses from education cutbacks are $179.5 million, compared to $230.8 million in the untargeted scenario, a gain of 51.3 million.

As expected, in the Panel B targeted assistance scenario, net benefits are distributed much more progressively. In the Panel B scenario, net benefits for the lowest-income quintile are $245.7 million. This $245.7 million is 8.30 percent of overall net income gains of $2,961.4 million, significantly above this group's baseline income share of 5.08 percent. Furthermore, the Panel B net income gain for the lowest-income quintile of $245.7 million is $247.2 million more than the net income effect on the lowest-income quintile in the Panel A scenario, which was a loss of $1.5 million. In other words, in switching from untargeted to targeted business services to local business owners, the lowest-income quintile gained $247.2 million out of the total gain of $477.6 million, over half (51.76 percent) of the total income gains.

This progressivity of switching to targeted business assistance is in large part due to greater business income for local business owners in the bottom income quintile. Under the Panel B targeted scenario, the bottom quintile gains $248.3 million in extra local business income, compared to $58.0 million in the Panel A untargeted scenario, a gain of $190.3 million. The lowest-income quintile's gain of $190.3 million in greater local business income is over three-fourths (76.96 percent) of the lowest-income quintile's $247.2 million gain in total net income. But in the targeted Panel B scenario, compared to the untargeted Panel A scenario, the lowest-income quintile also gains from the greater labor market benefits. For the lowest-income quintile, labor market benefits increase by $35.5 million ($67.9 million under the targeted scenario, compared to $32.4 million under the untargeted scenario).

In sum, targeting assistance to local business owners more evenly across the income distribution can help improve overall benefits and make the distribution of incentives more progressive. But how robust are such results to some of the underlying model assumptions? The next two sections analyze how modifying some assumptions alters net benefits of assistance to local business owners.

How the Impacts of Assistance to Local Business Owners is Modified by Different Assumptions, Part 1: Assuming a Wage Premium

So far, the results suggest that highly effective services to local business owners can have high economic benefits. How do these results changes when we modify model assumptions?

Up to now, in analyzing assistance to local business owners, I have continued the baseline assumption that incented firms pay a zero-wage premium. This assumption limits the impact that assisting local business has on improving local incomes. Because I also assume that these local businesses are not export-base businesses, the increase in assisted firms' business activity and jobs leads to reduced business activity and jobs in other area firms. This substitution still yields some net labor market benefits because I assume that the locally owned firms use more local suppliers, and that local business owners spend some of their extra profits locally. But with zero wage premium, there is no wage premium gain from substituting jobs in assisted businesses for jobs in other area firms.

In contrast, if we assume that assisted firms pay a high wage premium, then there is an additional labor market benefit from substituting jobs in assisted businesses for jobs in other local firms. This extra wage premium could come in the form of higher-wage jobs for the same skills, or it could instead mean that the assisted businesses pay similar wages but are willing to hire workers with lower credentials. Because in these scenarios we are assuming a 10-to-1 effectiveness ratio for these customized services, there is a relatively large substitution effect between assisted and unassisted local firms. As discussed previously, this extra wage premium benefit is distributed slightly regressively, as the model assumes that an extra wage premium is distributed according to each quintile's baseline share of total labor income, and the lower-income quintiles tend to have a somewhat below-average share of their income from labor (as opposed to income transfers).

In Table 23, Panel B, I present the results when the local business owners who are assisted pay a 10 percent wage premium. These results are compared with the previously considered zero percent wage premium assumption, in Panel A.

Adding a 10 percent wage premium has large effects on net benefits. Net benefits increase to 5,093.7 million in the Panel B 10 percent wage premium scenario, compared to $2,961.4 million in the Panel A zero wage premium scenario. Benefits become distributed modestly less progressively, but all income quintiles gain substantially. As this example illustrates, there are large local income benefits from substituting high wage-premium jobs for zero wage-premium jobs. So, in designing local business assistance policies, policymakers might want to consider trying to encourage the assisted businesses to be willing to either pay higher wages or hire workers with lower credentials.

How the Impacts of Assistance to Local Business Owners is Modified by Different Assumptions, Part 2: Changing the Assumptions about Service Effectiveness

As mentioned, empirical evidence suggests that some customized services may have an effectiveness in spurring job creation, compared to tax and other cash incentives, of 10 times greater. But what if customized services are not so extremely effective? This section explores that question.

Some experimentation with the local business assistance scenario suggests that such services can pass a benefit-cost test, that is have positive net benefits, even if the effectiveness of the services is far closer to 1 than to 10. Consider the scenario that has been our recent focus: moderately income-targeted services to locally owned businesses that are zero percent export-base (Table 22, Panel B, reproduced in Panel A of Table 23). In Table 24, I consider less extreme ratios of service effectiveness to cost ratios: 2, 3, 4, and 5.

Table 23 Implications for Local Owner Incentive Policies of 10 Percent Wage Premium

Panel A (= Panel B of Table 22): High-effectiveness services to local nonexport businesses with less regressive distribution of services and zero wage premia in incented jobs

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	2,961.4	245.7	292.8	488.9	760.7	1,173.4
Net local budget costs	(307.8)	(32.8)	(38.5)	(47.2)	(59.1)	(130.3)
Labor market benefits	579.6	67.9	98.8	150.8	77.8	184.3
Property-value benefits	153.4	4.8	7.4	10.1	18.1	113.0
Education cutbacks	(179.5)	(42.6)	(39.6)	(34.6)	(31.8)	(30.9)
Local business effects	2,715.7	248.3	264.6	409.7	755.7	1,037.3

Panel B: Same as Panel A, but 10% wage premium of incented jobs

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	5,093.7	337.1	470.3	778.9	1,223.7	2,283.7
Net local budget costs	(307.8)	(32.8)	(38.5)	(47.2)	(59.1)	(130.3)
Labor market benefits	2,711.8	159.3	276.2	440.9	540.8	1,294.5
Property-value benefits	153.4	4.8	7.4	10.1	18.1	113.0
Education cutbacks	(179.5)	(42.6)	(39.6)	(34.6)	(31.8)	(30.9)
Local business effects	2,715.7	248.3	264.6	409.7	755.7	1,037.3

NOTE: Panel A is identical to Panel B from Table 22: incentives go to local nonexport firms through efficient services, with services targeted toward broad income distribution.
However, jobs are assumed to pay no wage premium, which reduces the gains of substituting incented jobs for nonincented jobs within local labor market.
Panel B adds a 10% wage premium, which means there is additional wage premium gain from creating incented jobs, even if they substitute for nonincented jobs. This is additional gain in terms of job quality, and it goes beyond gain from greater local purchases of locally owned businesses. In Panel B, the minimum effectiveness-to-cost ratio to get net benefits is 1.0—that is, no more effective than cash.
Quantile income shares are percentages of total income.
All numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.

As Table 24 shows, all these service effectiveness assumptions result in incentives to non-export-base locally owned firms having net benefits. However, net benefits and the progressivity of such benefits go up considerably for even modest increases in service effectiveness. For each 1-unit increase in the service effectiveness-to-cost ratio, net benefits go up in a range between $377 million and $461 million, which is a sizable increase compared to incentive costs of $508.5 million. About 10 percent of the increased net benefits go to the lowest income quintile, so the progressivity of net benefits goes up as we increase the ratio of service effectiveness to costs.

But under the assumptions made, even at an incentive effectiveness of 3 to 1, these services to local businesses do not have a clear progressive effect on the income distribution. For example, in Panel B, at a service effectiveness ratio of 3 to 1, the shares of net benefits going to the five quintiles are: lowest-income quintile, 2.98 percent; Quintile 2, 4.95 percent; Quintile 3, 15.49 percent; Quintile 4, 31.95 percent; highest income quintile, 44.63 percent. The policy tends to

Table 24 Returns to Local Owner Incentives through Cost-Effective Services, with Less Extreme Assumptions about Service Effectiveness

Panel A: 2-to-1 service-effectiveness-to-cost ratio (other assumptions: locally owned non-export-base, top 10 percent restricted to 10 percent of services)

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	196.8	(25.8)	(19.8)	24.1	100.7	117.6
Net local budget costs	(408.7)	(43.5)	(51.1)	(62.7)	(78.5)	(173.1)
Labor market benefits	79.3	9.3	13.5	20.6	10.6	25.2
Property-value benefits	20.1	0.6	1.0	1.3	2.4	14.8
Education cutbacks	(261.4)	(62.0)	(57.6)	(50.4)	(46.4)	(45.0)
Local business effects	767.6	69.8	74.4	115.2	212.5	295.7

Panel B: 3-to-1 service-effectiveness-to-cost-ratio

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	657.5	19.6	32.5	101.8	210.1	293.5
Net local budget costs	(391.4)	(41.6)	(48.9)	(60.0)	(75.1)	(165.7)
Labor market benefits	165.4	19.4	28.2	43.0	22.2	52.6
Property-value benefits	43.1	1.4	2.1	2.8	5.1	31.7
Education cutbacks	(247.3)	(58.7)	(54.5)	(47.7)	(43.9)	(42.6)
Local business effects	1,087.7	99.1	105.7	163.6	301.8	417.4

Panel C: 4-to-1 service-effectiveness-to-cost ratio

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	1,072.5	60.4	79.7	171.8	308.7	451.9
Net local budget costs	(375.8)	(40.0)	(47.0)	(57.6)	(72.1)	(159.1)
Labor market benefits	242.7	28.4	41.4	63.2	32.6	77.2
Property-value benefits	63.7	2.0	3.1	4.2	7.5	46.9
Education cutbacks	(234.7)	(55.7)	(51.8)	(45.2)	(41.6)	(40.4)
Local business effects	1,376.7	125.6	133.9	207.3	382.4	527.4

Panel D: 5-to-1-service-effectiveness-to-cost ratio

		Quintile				
Income Distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	1,449.5	97.5	122.4	235.4	398.4	595.8
Net local budget costs	(361.8)	(38.5)	(45.2)	(55.5)	(69.4)	(153.2)
Labor market benefits	312.3	36.6	53.2	81.3	41.9	99.3
Property-value benefits	82.3	2.6	4.0	5.4	9.7	60.6
Education cutbacks	(223.3)	(53.0)	(49.2)	(43.0)	(39.6)	(38.4)
Local business effects	1,640.0	149.8	159.6	247.2	455.9	627.5

NOTE: All these simulations assume locally owned non-export-base firm, receiving services with effectiveness-to-cost ratio greater than 1, and with assistance to businesses owned by top 10 percent of income distribution restricted to 10 percent, and with zero wage premium for assisted firms. The exact ratio of service effects on business costs and location decisions to incentive costs varies from 2-to-1 to 5-to-1 across four scenarios. Note that net benefits go up between $377 million and $461 million per 1.0 increase in service effectiveness. This compares with about $500 million in incentive costs. About 70% of the increase in net benefits with higher service effectiveness is due to increases in local business profits.

Also, net income of the bottom income quintile goes up as service effectiveness goes up, about 10 percent of the overall net income boost, so boosting service effectiveness is progressive. Quintile income shares are percentages of total income. All other numbers are in millions of present-value 2015 dollars. Negative numbers are in parentheses.

give below-baseline shares of benefits to the two lowest income quintiles and the highest income quintile, and above-baseline shares of benefits to the middle-income quintile and Quintile 4. To get more consistently progressive effects on the income distribution requires further increases in the service effectiveness ratio. For example, if we get to a service effectiveness ratio of 5 to 1 (Panel D), the lowest income quintile receives 6.73 percent of net benefits.

Policymakers could seek to increase the share of benefits to the bottom two income quintiles by encouraging assisted businesses to hire the local nonemployed—for example, by using the local workforce system. Policymakers could also increase benefits to the lower-income quintiles by targeting the business assistance programs to businesses owned by somewhat lower-income groups. Or policymakers could make the financing of the incentive program more progressive by financing a greater share from the tax system, or from more progressive taxes, including business taxes. But state and local governments would have to make a deliberate choice to do so. Simply delivering cost-effective services to local business owners does not necessarily take care of the regressivity problem until the service-effectiveness-to-cost ratio gets to a fairly high level.

In sum, services to locally owned non-export-base businesses can pay off for local economies even if the services are only slightly more effective than cash in spurring job-creation decisions. But as the effectiveness gets lower, more attention must be paid to distributional issues in how the services are financed and distributed.

CONCLUSION

A key conclusion from this model is that under realistic assumptions about how incentives affect local economies, benefits and costs for local residents are closely balanced. In the baseline scenario, the benefit-cost ratio for incentives is 1.223—gross benefits are only 22.3 percent greater than incentive costs (Table 4).

Why are benefits versus costs for incentives so closely balanced? Incentives can greatly benefit local residents by improving job opportunities. But costs of incentives are also high. We must consider the opportunity costs of incentives: financing incentives requires raising taxes or cutting spending. For incentives to clearly pay off for local incomes, many factors need to be simultaneously aligned to maximize benefits and lower costs. This is particularly true if we want incentives to not only pay off overall, but pay off for the lowest-income quintile. Perhaps somewhat surprisingly, even though incentives can promote job growth and increase employment-to-population ratios, the net effects of incentives on the income distribution need not be progressive, once one accounts for the opportunity costs of how incentives are financed.

Incentive effectiveness is altered by many different assumptions about the economy's workings and about incentive policies. Table 25 summarizes some of the findings of previous tables. The summary includes the dollar effect of a given assumption on net benefits. In addition, this net-benefit dollar effect is scaled by dividing it by gross incentive budget costs. This scaling expresses the assumption change in terms of how it affects incentives' benefit-cost ratio.

What factors matter for incentive effectiveness? It is no surprise that incentives are more effective in boosting local incomes

1) if incented firms are more cost sensitive to incentives,
2) if incented firms have higher multiplier effects on the local economy,
3) if incented firms are to a higher extent export-base firms,
4) if incented firms pay a wage premium, and
5) if incentives can be delivered by services that have an effect 10 times their budget costs.

But what is perhaps surprising is how much of a quantitative difference these factors make. Changes in any one of these assumptions can increase or decrease incentive benefits by over 50 percent of incentives' gross budget costs. Such differences easily could tip a benefit-cost analysis, and they certainly loom large relative to a baseline in which incentives' gross benefits exceed budget costs by only 22 percent.

Some factors, within the range of what seems feasible in the real world, matter more than others. The incentive-effectiveness-to-cost ratio matters the most, followed by the incentive multiplier. Figuring out ways to affect local job growth at lower budget cost, which is what customized services try to do, is well worth exploring. If prior research is right that such customized services can deliver job creation effects that are 10 times as great as cash incentives, then such customized

Table 25 Summary of How Net Incentive Benefits Change under Different Assumptions

Change	Net benefit change in millions of dollars	As proportion of incentive costs of $508.5 million	Table source
Cost sensitivity increases from −10 to −17	306.2	0.60	7
Multiplier increases from 2.5 to 6.0	1,399.8	2.75	8
Export base reduced from 100% to 50%	(505.1)	–0.99	9
Wage premia increased from 0% to 10%	340.4	0.67	10
Incentive efficiency increased from 1 to 10	5,317.1	10.46	11
Going from uniform incentives over time to up-front incentives	774.2	1.52	12
Change due to financing 100% by business-tax increases, compared to 100% by education spending cuts	2,753.5	5.42	14,15
Marginal public costs of more population are 10% above average costs	(209.1)	–0.41	16
Marginal revenue from new jobs is 10% above expected value based on usual tax structure	204.5	0.40	17
Increasing proportion of jobs going to local nonemployed by 10 percentage points	204.1	0.40	18
Change due to being in local area that initially has 10 percent unemployment, compared to area with 3 percent unemployment	304.2	0.60	19
Going from nonlocal ownership to local ownership for export-base firms	533.4	1.05	20
Efficient 10-to-1 services for locally owned firms with less regressive selection of assisted firms, compared to original baseline scenario of cash incentives for export-base firms	2,847.8	5.60	22, 6
Efficient 5-to-1 services for locally owned firms, compared to original baseline scenario	1,335.9	2.63	24,6

NOTE: The dollar figures are derived from previous tables. Net benefit changes are present value as of 2015, in millions of 2015 dollars. Each change represents specific changes in assumptions due to changing assumptions about policy or policy context. The proportions scale these changes by present value of incentive costs ($508.5 million).

services can increase benefits by a factor of more than 10 times incentive budget costs. This should get policymakers' attention. Exploring how such customized services can be designed and delivered effectively is well worth it, even if we can only increase the effectiveness-to-cost ratio to 2 to 1 or 3 to 1.

Getting to truly high multipliers also makes a very large difference. If in fact some high-tech manufacturing firms have a multiplier effect on local economies of 6 to 1 because of agglomeration economy "cluster effects," then targeting such high-tech firms for incentives can increase gross benefits by almost four times incentives' budget costs. Research that determines when such high multipliers occur for particular firm or industry types—in particular local economies—should be a high priority.

One surprising conclusion from the model is the sizable effects of how incentive payments are timed. Paying out incentives uniformly over the new facility's lifetime is extremely inefficient, resulting in very large net costs for local incomes of an incentive policy, whereas paying incentives totally up front significantly increases incentive benefits. Going from uniform to up-front incentive payments increases gross benefits of incentives by about 1.5 times incentives' budget costs. A big part of the potential benefits of incentives comes from targeting incentives at firms that are at the margin of making new investment decisions, and then exploiting the myopia of business decision makers to sway such decisions at little long-run cost to local taxpayers. This means that issues of claw-back agreements, and other ways of dealing with firms reneging on location decisions, become quite important, as firms reneging on location decisions pose a problem with offering up-front incentives.

What is even more important to incentive benefits is how incentives are financed. This of course influences who bears incentives' costs. But also of great importance are the enormous opportunity costs of financing incentives in ways that might have more adverse effects on local economic development than the direct benefits of incentives. The models suggest that financing incentives through a business tax is the most effective way of doing so, more than quadrupling overall net income benefits (Table 15, net income gains of $501.1 million from business tax financing in Panel C, versus $113.6 million in the baseline scenario). This is in part because it allows much of the cost of incentives to be exported to nonlocal owners of businesses. The advantages of cost exporting to out-of-state business owners outweigh any negative economic development impacts of increasing overall business costs with increases in general business taxes. In addition, the distribution of net benefits is more progressive with business tax financing of incentive costs, in part because business ownership is skewed toward the upper income brackets. Although this is not part of the incentive simulation model, it is also the case that financing incentives by taxes on the top 10 percent of the income distribution would likely be beneficial, as this income group has a lower marginal propensity to consume local goods and services, as argued by Orszag and Stiglitz (2001) and as empirically estimated by Zidar (2017).

On the other hand, financing an incentive policy through cutbacks in high-quality public services, such as productive spending on K–12 education, can have very destructive implications for local economic development. The economic development cost of cutting back K–12 spending to finance incentives is estimated to have negative economic development consequences that lead to net income losses of almost 20 times the gains in the baseline scenario (Table 14, loss of $2,252.4 million in education financing scenario, versus $113.6 million gain in baseline scenario). To put it another way, if the choice was between expanding the baseline incentive package or expanding K–12 spending in a productive way, it would be clear that expanding K–12 spending to promote long-run wage growth would be a more effective strategy. In addition, financing incentives by cutting or forgoing K–12 education spending also has extremely regressive effects on the income distribution, as K–12 education spending is estimated to have large effects in increasing wages for the lowest-income quintile.

On net, as shown in Table 25, switching from financing incentives by education spending cuts to financing incentives by business tax increases has large benefits. Such a change would increase the gross benefits of incentives by 5.42 times incentives' budget costs.

In contrast, within the range of what seems to be typical variation, differences in likely fiscal benefits do not matter as much. Increasing or decreasing the marginal revenue or marginal spending impacts of job creation does not matter enormously if such plausible variations are restricted to 10 percent greater or lesser effects on revenue or spending.

Who gets the jobs also matters to incentive benefits. But the effects are of moderate size except for extreme cases. For example, increasing the proportion of jobs that go to local residents who would otherwise be out of the labor force by a factor of 1.43, from 23 percent to 33 percent, increases gross benefits by 40 percent of incentive budget costs. While this is an important effect, it clearly is much smaller than the implications of increasing multiplier effects from 2.5 to 6.0, or increasing incentive effectiveness-to-cost ratios from 1-to-1 up to 10-to-1. Similarly, the benefits of more jobs for the local nonemployed in areas with high unemployment, versus low unemployment, makes an important difference, but one that is surprisingly moderate even for major changes in unemployment rates. Going from an initial 3 percent unemployment rate to 10 percent initial unemployment increases benefits by 60 percent of budget costs, which is a large amount, but surprisingly moderate given the size of the change in initial unemployment.

A final surprising conclusion is that incentives to locally owned firms can make sense even if these locally owned firms are non-export-base. However, these incentives must then be designed as at least moderately cost-effective services. For example, as shown in Table 25, if such incentive services to locally owned businesses have an effectiveness-to-cost ratio of 5 to 1, such services can increase gross incentive benefits by 2.63 times incentives' gross budget costs. In addition, the distributional implications of assistance to locally owned businesses depend greatly on the rules governing eligibility for such assistance.

The broader lesson from this incentive simulation analysis is that incentive policy should be thought of as part of a broader set of policies to promote economic development: these policies include business tax policies, other tax policies, and spending policies for business services and household services. These economic development policies should be designed in a way that substantially includes all income groups in the benefits from local economic development, and that at least does not worsen the distribution of income. Business-tax-incentive policy should not come at the expense of customized services to small and medium-sized businesses that might be more cost effective in affecting business decisions, nor should it come at the expense of K–12 spending that might be more effective in promoting higher local wages. And business-tax-incentive policy could be folded into a business tax policy that seeks sufficiently high overall business taxes to raise needed revenue and, where possible, to export some tax costs, while also helping promote business investment decisions by high-wage-premia, high-multiplier export-base businesses.

If taken seriously, these model simulation results have the potential to transform the debate over economic development policy. The debate over economic development incentives would proceed quite differently if it were understood that such incentives are best financed by higher business taxes or higher taxes on the top 10 percent of the local income distribution. This implies that proposals to expand business incentives should be accompanied by proposals to increase business tax rates or tax rates on high-income groups to ensure that net business tax revenue and tax revenue from the top 10 percent of the income distribution are not appreciably lowered by these incentive proposals. In addition, if incentive policies emphasized up-front incentives, then the debate over paying for high-cost incentives would become more intense, as it would then be impossible for governors and mayors to pass on incentive costs to their successors. Finally, if incentive policy was reoriented to emphasize a greater share of incentives devoted to customized services rather than to tax incentives, state and local economic development agencies would be transformed in their operations and political base of support. Economic development agencies would need to focus more on improving the overall quality of services to many businesses, and less on cutting individual tax incentive deals. A focus on customized services would mean that state and local economic development agencies would have more of a political constituency in small and medium-sized businesses than in large businesses.

Local economic development is a worthy goal. But for local economic development to have large and progressive effects on improving local incomes, the design and financing of economic development policies need major reforms.

APPENDIX A: Possible Reduced Effectiveness of Incentives Distributed as Subsidies to Retain Jobs at Existing Firms

Economic development incentives sometimes go to retain existing firms—that is, to retain jobs rather than to create jobs. What difference in effectiveness might such "retention" incentives have, versus incentives for new investment decisions for new facilities?

There might be at least four reasons to expect somewhat different effects of some incentives to existing firms to retain jobs, rather than incentives for new facilities:

1) As explained below, if the incentive is an unconditional cost reduction, not tied to a marginal investment decision, we might expect the incentive to have smaller and much more temporary effects.

2) The cost sensitivity might be somewhat lower.

3) The multiplier might be somewhat higher.

4) The depreciation of incented jobs might be higher.

I will consider these cases in order.

If incentives to existing firms are conditioned on some specific firm-investment decision, then such incentives are similar in character to incentives for firms investing in a new facility or an expanded facility. This can be the case even if the incentives are for job retention, if the incentive is tied to the firm making specific new investments in the facility. In all these cases where the incentives are targeted on some type of marginal investment decision, the incentives will have some immediate effects on the probability of that investment decision being made, followed by some multiplier effects, and followed by some time path of those induced and multiplier jobs over time. For a retention decision, it is possible that the cost-sensitivity or inducement probability will be different (Case 2), or the multiplier might be different (Case 3), or the subsequent time path might be different (Case 4). All of this will be discussed when we get to Cases (2), (3), and (4). However, what if the incentives for job retention are not conditioned on any quid pro quo for a new investment decision by the firm? This is Case (1). In that case, it is reasonable to assume that the incentive will have much smaller effects. The incentive will lower costs, at least while it is provided. Due to lower costs, we would assume the firm would want to increase employment. However, this adjustment to lower costs would be gradual, not immediate. In the long run, after the incentive goes away, the incented firm would have no desired change in employment, and the firm's employment should gradually return to whatever level that would have otherwise attained.

To capture these effects within this model, I treat such an unconditional series of cost subsidies to an existing firm similarly to how the model treats the effects of higher overall business taxes, or other higher costs, on overall private employment. Each year, I assume the incented existing firm adjusts 9 percent toward the employment level implied by the incented firm's assumed cost sensitivity to last year's incented-induced shock to costs. Because the incentives run out after 20 years, in the long run, the existing firm returns to the employment level it would have otherwise attained.

Under these assumptions, in which incentives are *not* conditioned on marginal investment decisions, effects on job creation by incented firms are much less. The job creation effects are more gradual, and more temporary.

Table A1, Panel B, shows the results under this unconditional cost-subsidy scenario. Net benefits are enormously reduced, switching from positive \$113.6 million under the baseline to minus \$470.7 million under the unconditional cost subsidies. All income quintiles suffer net income losses due to these unconditional cost subsidies for existing firms.

Most of these reduced net benefits are due to lower labor market benefits. Labor market benefits are reduced from \$521.7 million under the baseline scenario to only \$147.8 million under the unconditional cost-subsidy scenario.

Unconditional cost subsidies throw away one of the potential advantages of firm-specific incentives, which is that they do not go to *any* firm, but only to firms considering making a specific commitment of additional business capital to this location. Targeting marginal investment decisions is more efficient than providing incentives to the many firms that are not even considering a new investment decision. Providing subsidies to all firms results in a more gradual response, as only a minority of firms are adjusting their capital and business activity during any given year. Furthermore, conditioning incentives on the firm's capital investment commits the firm more to continuing to have business activity in this area, and therefore has effects that are potentially more permanent.

However, perhaps it is true that in most cases, a retention incentive is tied to specific investments by the firm in the existing facility. In that case, the incentive may have some immediate effects on the probability of that investment taking place. However, that probability effect or cost-sensitivity might plausibly be somewhat less (Case 2), as it seems likely that the existing firm is somewhat less footloose than a new facility location decision.

A lower cost sensitivity of marginal investment decisions was already considered in Table 7. As outlined there, a lower cost sensitivity can have large effects in reducing the net benefits of incentives. For example, if the cost sensitivity was −3, rather than the baseline scenario of 10, net benefits become −\$487.7 million, compared to the baseline scenario net benefits of \$113.6 million.

On the other hand, an existing firm receiving a marginal investment incentive might be more likely to have a higher multiplier (Case 3). We would expect existing firms in a local area, holding industry constant, to have somewhat higher multipliers than a similar new facility, at least in the short run. As outlined in Table 8, and as discussed in a footnote in the text, each 1.0 increase in the permanent multiplier yields an increase in net benefits by about \$400.0 million, or about 80 percent of incentive budget costs. How much net benefits would go up for existing firms given a retention incentive for a marginal investment would depend upon how permanent the differential multiplier effects are for an existing firm versus a new facility.

Note that Cases (2) and (3) might also apply to existing firms making marginal investment decisions about expanding, not just existing firms making marginal investment decisions to retain jobs.

Table A1 Incentive for Retention: Some Possible Effects

Panel A: Baseline scenario: Incentive targeted at new or expanding business, or at marginal investment decision by retained firm

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Retention incentive or any other incentive that is unconditional cost subsidy, not conditioned on marginal investment decision

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(470.7)	(83.8)	(78.4)	(68.8)	(97.1)	(142.5)
Net local budget costs	(398.0)	(42.4)	(49.7)	(61.0)	(76.4)	(168.5)
Labor market benefits	147.8	17.3	25.2	38.5	19.8	47.0
Property-value benefits	42.1	1.3	2.0	2.8	5.0	31.0
Education cutbacks	(252.7)	(59.9)	(55.7)	(48.7)	(44.8)	(43.5)
Local business effects	(9.9)	(0.2)	(0.2)	(0.3)	(0.6)	(8.5)

Panel C: Retention incentive or any other incentive in which incented firm activity depreciates at 6.57% annually

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(335.7)	(77.8)	(56.6)	(21.1)	(92.5)	(87.6)
Net local budget costs	(592.9)	(63.1)	(74.1)	(90.9)	(113.8)	(251.0)
Labor market benefits	467.4	54.8	79.7	121.6	62.7	148.6
Property-value benefits	128.7	4.1	6.2	8.4	15.2	94.8
Education cutbacks	(307.3)	(72.9)	(67.8)	(59.2)	(54.5)	(52.9)
Local business effects	(31.6)	(0.7)	(0.7)	(1.1)	(2.0)	(27.0)

NOTE: Quintile income shares are percentages. All other numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.
The Panel B scenario is identical to baseline, except incentives are assumed to go to “retain” jobs by providing unconditional cost subsidies for an existing firm, without requiring additional marginal investment in facility.
Panel C scenario is same as baseline, except it assumes that incented firms’ activity tends to depreciate at 6.57% annually rather than baseline 2.59%. This requires higher incentives after Year 20 to maintain incented jobs.
Either scenario could also apply in some cases to incentives to nonretained firms.

Incentives might not be as effective in inducing marginal investment decisions for existing firms compared to new facilities, but might have higher multiplier effects.

The final case, Case (4), concerns the time path of the incented jobs. In the baseline scenario, and all other scenarios considered in the report's text, it is assumed that the induced activity on net shows no depreciation or appreciation for the first 20 years, then tends to depreciate at 2.59 percent per year without further incentives. The baseline model assumes this depreciation is prevented by providing additional incentives at a more modest scale. The 2.59 percent depreciation rate is the average depreciation rate of business real estate.

However, in the case of firms seeking retention incentives, it may be that those firms, and the industries in which they occur, may face particularly difficult economic headwinds going forward. If so, it is possible that there will be a tendency toward greater depreciation of incented firms' activity over time.

Table A1, Panel C, considers a case in which the baseline scenario is altered in one feature: instead of assuming a 2.59 percent depreciation tendency of incented firms' induced jobs after Year 20, the scenario assumes that incented jobs tend to depreciate after Year 20 at 6.57 percent per year. This 6.57 percent is the average depreciation rate for export-base industries of business real estate plus business machinery and equipment. This depreciation tendency is assumed to be offset by continued incentives. But because the depreciation tendency is higher, the future incentives must be higher. In the higher depreciation scenario, net benefits are reduced to −\$335.7 million, compared to \$113.7 million, a reduction of \$449.3 million. Most of this reduction is due to the higher required future incentives, which raise budget costs and increase wage losses because of education cutbacks.

Note that this Case (4) also need not apply solely to retention decisions. Such a scenario could also apply in other cases where the incented firms have more firm-specific or industry-specific long-run challenges than is assumed in the baseline scenario.

To what extent do these four cases apply to typical incentives to retain firms? Unfortunately, as of right now we do not have specific quantitative estimates on the relative effectiveness of incentives to retain firms versus incentives to new facilities, or for that matter versus incentives to encourage expansions of existing firms. This is an important need for future incentives research.

Does this mean we have no knowledge about incentives for firm retention that is useful to policymakers? I would say we have some qualitative suggestions, which suggest directions for policy, although we cannot quantify the exact benefits of retention incentives. Policymakers should certainly consider conditioning incentives on marginal investment decisions as much as possible, to get firms to commit to locating their capital stock in the area. Policymakers should seek to explore how footloose an existing firm, or a new facility, might truly be in making a location decision. Policymakers should see if the firm's circumstances are likely to make multipliers larger or smaller than assumed for firms in the same industry by input/output models such as IMPLAN, or regional econometric models such as REMI. Finally, policymakers might want to assume benefits would be somewhat less if a firm's long-term prospects seem to be worse than the average firm. This qualitative guidance is useful for policymakers, even if exact quantitative numbers are unavailable.

APPENDIX B: Depreciation and Its Consequences for the Model

As discussed in the report's text, the model assumes that without continued incentives, after Year 20, the incented activity will tend to depreciate. The assumed depreciation tendency is 2.59 percent annually. This depreciation rate is the average rate of depreciation of business real estate for export-base industries. In the baseline model, the assumed depreciation tendency is assumed to be offset by future incentives after Year 20.

In this appendix, I want to briefly consider the implications of this depreciation assumption for the model. First, I want to show that the assumption that the depreciation is offset by future incentives is not crucial to the model. If instead the depreciation is allowed to occur, very similar benefit-cost ratios occur. Second, I want to consider the implications of assuming zero depreciation. If short-term incentives can permanently raise economic activity without any future depreciation, this obviously will tend to increase the benefit-cost ratio of incentives. But as I will show, it does not dramatically alter the relative benefits across most scenarios that do not differ in incentive financing. Even for other scenarios, the general qualitative picture is not dramatically altered.

On the first point, it should be intuitively clear that if depreciation can only be offset by new incentives with a similar benefit-cost ratio, then the overall benefit-cost ratio for incentives is not altered by whether or not the new incentives are provided. This can be shown to hold in theory and in this model.

Consider a simple model of incentives, with only two time periods. Incentive costs are incurred in the first time period of C1. Benefits occur in the first time period at rate B1, and in the second time period at rate $B2(1 - d)$, where d reflects some depreciation from what benefits would be if depreciation did not occur.

In this situation, the benefit-cost ratio for the present value of benefits to the present value of costs is:

$$M = [B1 + B2(1 - d) / (1+r)] / C1 ,$$

where r is the social discount rate. Suppose now we seek to offset the depreciation, and that to do so we provide incentives at rate dC1 in the second time period. Suppose the benefits provided by this investment are equal to the same benefit-cost ratio, and therefore accrue at the rate MdC1 in the second time period. Then the benefit-cost ratio of the combined incentive package, both first and second time periods, is

$$M^* = \{B1 + [B2(1 - d)/(1+r)] + [MdC1/(1+r)]\}/\{C1 + [dC1/(1+r)]\}$$

$$= \{MC1 + [MdC1/(1+r)]\}/\{C1 + [dC1/(1+r)]\}$$

$$= M$$

Therefore, the overall benefit-cost ratio is unchanged by whether or not we provide future incentives to offset the depreciation, or just allow the depreciation to occur.

This theoretical notion can be shown to approximately hold in this model. If the model is rerun with no incentives provided after Year 20, but with jobs in incented firms assumed to depreciate at 2.59 percent per year, the benefit-cost ratio of this new policy scenario is 1.266. This is almost the same as the 1.223 benefit-cost ratio of the original baseline scenario, as described in Table 4. The benefit-cost ratios are not exactly the same in part because the model only measures benefits and costs for an 80-year period, and not over an infinite time horizon.

What if instead we assume that no depreciation occurs? That is, after the initial incentives are provided, which lower costs enough to induce the firm to change its location or expansion decision, we assume that no future incentives need ever be provided to induce the firm to maintain that decision. One would expect this change to increase net benefits, as it provides the same job creation effects at lower incentive budget costs, with favorable consequences for other effects in the model.

Table B1 shows the effects of the no-depreciation scenario in Panel B, with a comparison to the baseline scenario in Panel A.

Table B1 Comparison of Baseline Scenario with Zero Depreciation Scenario

Panel A: Baseline scenario

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Local business effects	(33.9)	(0.7)	(0.8)	(1.2)	(2.2)	(29.1)

Panel B: Same as baseline, except assume that there is zero depreciation and therefore no incentives after Year 20

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	405.8	24.6	56.1	107.4	40.3	177.4
Net local budget costs	(153.8)	(16.4)	(19.2)	(23.6)	(29.5)	(65.1)
Labor market benefits	556.9	65.3	94.9	145.0	74.7	177.1
Property value benefits	158.3	5.0	7.7	10.4	18.7	116.6
Education cutbacks	(120.1)	(28.5)	(26.5)	(23.1)	(21.3)	(20.7)
Local business effects	(35.5)	(0.8)	(0.8)	(1.2)	(2.3)	(30.4)

As expected, the no-depreciation scenario increases net benefits to $405.8 million, up from $113.6 million in the baseline scenario, an increase of $292.2 million. Most of these increased net benefits are from lower net budget costs, and from lower wage losses from education cutbacks. All quintiles now gain from the incentive policy, and the net benefits are distributed moderately progressively.

However, overall, the benefit-cost picture, although more favorable with the zero depreciation scenario, does not change dramatically. Incentive policy is still balanced between benefits from more jobs in labor market benefits and property value benefits, and costs both in budget costs and education cutbacks.

For policy purposes, one key issue is how the *differences* in net benefits with different policies vary between the depreciation scenario and the nondepreciation scenario. The two scenarios largely differ in assumptions about how much in incentives must be spent to get persistent job creation effects. For policies that don't affect how incentives are used, one would expect the relative benefits across different policy scenarios to be quite similar. In contrast, for policy scenarios that involve different uses of incentive dollars, the depreciation assumption may alter relative benefits somewhat.

Table B2 shows the differences caused by different policy scenarios, compared to the baseline scenario, in a no-depreciation world versus a depreciation world. The first row shows the baseline net benefits. Other rows show the differences in net benefits caused by different policy scenarios.

As shown in Table B2, for most scenarios that do not involve how incentives are used, the difference in net benefits from the baseline for different policies is almost the same under the depreciation and no depreciation scenarios. For example, going from a multiplier of 2.5 to a multiplier of 6.0 increases net benefits by $1,399.8 million in the depreciation case and $1,354.6 million in the no-depreciation case. The difference in net benefits is also extremely similar for changes in cost sensitivity, export-base percentage, the wage premium, incentive effectiveness, the marginal cost and marginal revenue associated with new jobs, different labor force participation rate effects, and different local unemployment rates.

The effects of diverse policies in the depreciation and no-depreciation case becomes more distinct when the policy scenario involves some change in what happens to incentive costs: how incentives are financed, whether incentives are up-front or uniform, and whether incentives go to local firms. For example, in the depreciation case, going from the baseline scenario to the 100 percent education-financed scenario reduces net benefits by $2,366.1 million, whereas in the no-depreciation case, the reduction in net benefits is $1,422.5 million.

Assuming some tendency toward depreciation, at least without additional incentives being provided, seems more realistic. However, the main policy conclusions about what affects net benefits of incentives would remain mostly the same even if we assumed no depreciation. The policy changes that make the most difference in increasing incentives' net benefits include pursuing higher multiplier businesses, adopting cost-effective services, and financing incentives through business taxes rather than cuts in education spending.

Table B2 How Net Benefits Differ from Baseline under Depreciation versus No-Depreciation Scenario

	Depreciation	No depreciation	Corresponding table
Baseline	113.6	405.8	6
Difference in net benefits from baseline due to:			
Cost sensitivity of −3	(601.3)	(574.7)	7
Cost sensitivity of −17	306.2	293.3	7
Mult. of 6.0	1,399.8	1,354.6	8
Mult. of 1.5	(400.0)	(387.0)	8
Export base of 50%	(505.1)	(488.8)	9
10% wage premium	340.4	329.4	10
10-to-1 effectiveness	5,317.1	5,236.2	11
Uniform incentives	(434.3)	(726.5)	12
Up-front incentives	339.9	747.6	12
100% spending cut financed	(305.0)	(172.7)	14
100% education spending financed	(2,366.1)	(1,422.5)	14
100% tax financing	294.5	165.2	15
100% business tax financing	387.5	214.8	15
MC of pop 10% gt AC	(209.1)	(216.1)	16
MC of pop 10% lt AC	233.4	241.0	16
Marginal tax revenue 10% above average	204.5	211.6	17
Marginal tax revenue 10% less than avg.	(185.3)	(191.9)	17
Higher lfpr effects	204.1	214.4	18
Initial 10% UR	174.6	168.0	19
Locally owned firms	533.4	360.8	20
Locally owned nonexport	(502.5)	(641.7)	20
Nonlocal nonexport	(1,010.3)	(977.6)	20
High effectiveness services to locally owned nonexport base	2,370.2	1,269.9	21
High-effectiveness services with more progressive business assistance	2,847.8	1,548.3	22
High-effectiveness services to locally owned nonexport base that also pay 10 % wage premia	4,980.0	3,642.3	23
5-to-1 effectiveness for services to local firms	1,335.9	559.5	24

NOTE: The baseline shows net benefits in depreciation scenario (Table 6) and the equivalent nondepreciation scenario.
The other rows show differences of the net benefits in some other scenario compared to the baseline, under both the depreciation and nondepreciation scenarios.
The depreciation scenario figures are derived from the tables listed in the corresponding table column.

APPENDIX C: More Details on the Simulation Model

Introduction

The purpose of this appendix is to provide some further details on the procedures used to implement the simulation model. Most of the explication of the model is in the report; this appendix seeks to preserve sufficient additional details that the model could be fully understood and reconstructed by an interested reader.

The simulation model assumes a "small" program, relative to the size of the state economy. The baseline characteristics of the state or local economy may alter incentive impacts, and incentives are estimated in the model to have economic effects. But we ignore the feedback effect due to incentives altering state or local economic characteristics, as we also ignore these alterations in turn changing incentive impacts.

The model has various factors that either multiply or shrink the impact of incentives on the local area's overall income. These impacts on different types of income are then divided among different income quintiles.

Among the features of the program that multiply or shrink the overall impact are the following, as fully explained in the main report:

- The incentive program has some cost, and it has some initial impact on the incented industries.
- The initial impact on the incented industries yields some multiplier effects on overall employment.
- The overall change in employment has some effects on housing prices and wages.
- The effects on housing prices and wages in turn have effects in reducing other employment, with some lag. These housing price and wage increases also have some effects in reducing the business income of locally owned businesses.
- The financing of the program through tax increases and spending cuts has some demand-side and supply-side effects on employment and wages.
- Some of the incentive cost may be paid to local owners of capital, enhancing their income. This also has some demand-side effects on the economy.
- The overall impact of the program on employment yields some effects on overall employment-to-population ratios, and this, in addition to wage changes, yields effects on per capita income, and implied effects on population.
- The directly incented jobs or the spinoff jobs may pay some wage premium, and that wage premium may have some spillover effects on wage standards for state residents.
- Effects on per capita income and population yield effects on various other spending and revenue categories, resulting in fiscal surpluses and deficits.

- These effects on fiscal surpluses and deficits, with some lag, force tax increases and spending cuts, which have some demand-side and supply-side effects on employment and wages, just as do direct incentive costs.
- The overall effects on per capita income, and the effects on various tax and spending liabilities, are divided among different income quintiles of the population.

Because the incentive impact is assumed to be small relative to the overall economy, the various elasticities can be converted into linear multipliers that translate a linear change in one variable into a linear change in another variable.[116] So, for example,

- the net job effect of the model is modeled by a "multiplier" term that gives the dollar change in wages in one part of the model,
- the job effect is multiplied by another term that gives the dollar effect on personal income and the population effect in another part of the model,
- the dollar effect on personal income is multiplied by still another term that gives dollar effects on personal income tax revenues, and
- the effect on population is multiplied by a term that gives the dollar effect on required public spending.

Examples will be given below.

This linearization enormously simplifies the model. A previous version of the model was written solely in terms of elasticities. Calculation of effects on different variables then requires creating a baseline time series for all predicted variables so that, using the elasticities, the logarithmic effects can be translated into actual effects on different variables. In contrast, the linearization uses the elasticities, but can simply use some baseline ratios of the levels of key variables at one point in time to calculate linear multipliers relating one predicted variable to another predicted variable. Relying on the observed levels of variables at one point in time to yield simulation results is much simpler than relying on questionable assumptions about the future trend growth rate in such variables. The model must make a few assumptions about growth rates, but if the model was kept in the elasticity form, virtually all variables would have to have predictions of future growth rates, which would be altered by interactions with incentives.

Incentive Cost and Effects on Incented Firms

This part of the analysis is straightforward, and in large part is adequately detailed in the main report, except for three additional details.

The first additional detail is that throughout the model, in figuring out dollar values, the model assumes that from 2015 on for the next 80 years, the overall productivity of the economy grows by

116 The one exception is the effect of incentives on firm location decisions, which instead is based on a constant elasticity model because, as explained below, incentives cannot be assumed to be small relative to the costs of the incented firm.

1.2 percent annually. This is based on estimates from the Social Security Trustees that this is the long-run-trend growth rate of real wages in the economy (SSA Trustees 2016). Thus, in determining the real wage rate associated with a certain number of jobs of some type in year *t*, it is assumed that real wages grew at 1.2 percent per year between 2015 and year *t*. Real value-added per job is also assumed to grow at 1.2 percent per year, in any calculations that require real value-added.

This also means that 2015 is treated as Year 1 in the simulation—that is, 2015 is the year in which the simulation package is awarded to the incented jobs, and from which it is paid out over the next 20 years. Therefore, all dollar variables throughout the model are expressed in Year 2015 values. If possible, ratios of levels of nominal variables are based on their value in 2015 data. If this is not possible, the CPI–U−RS is used in most cases to re-express nominal values of other years in 2015 real values.

Thus, for example, as detailed in the main report, I assume that there are 10,000 jobs that are incented, and that they are in the 31 export-base industries identified in Bartik (2017a). The calculations of average 2015 value-added and wages for these 31 export-base industries are based on 2015 value-added by industry, calculated using national BEA data. I assume that the incentives start in 2015, and that over the next 20 years, as the number of incented jobs stays at 10,000, value-added per job and wages grow at a 1.2 percent rate. This is based on assuming real wages and real compensation will also grow at a 1.2 percent rate, according to Social Security Trustee assumptions.

The second additional detail is that in modeling the effects of incentives on the location decisions of incented firms, I cannot approximate these effects with a linearization, as it is inappropriate to assume these effects are small relative to the costs of incented firms. Instead, I assume that the average effect of a change in log costs of firms translates into a change in the expected logarithmic level of expected employment for the firm. In other words, I must assume some explicit functional form for the effects of incentives on incented firms, because these effects cannot be assumed to be small, and I choose to assume a constant elasticity functional form. If this were not done—for example, if we had a very large incentive, say 20 percent of costs, and we assumed a cost responsiveness of 6, and linear functional form—we would get the absurd result that the incentive increases the probability of the firm choosing the location by 120 percent.[117] See Appendix D for more details on the implications of this functional form assumption for the effects of incentives on incented firms.

Multiplier Effects

The multiplier analysis is also straightforward, and, by and large, is adequately detailed in the main report.

The one extra detail is about the extra local multiplier due to local ownership. This extra local multiplier is reduced to the extent to which the induced employment in one locally based firm displaces other locally owned employment. Therefore, some assumptions must be made about the

117 In addition, because the logarithmic formulation of how costs affects location probabilities blows up if costs become zero or negative with incentives, the assumed effect on the probability of location of incented firms is maximized at close to 100 percent by not permitting the "effective" cost reduction to exceed 99.99 percent. See Appendix D.

extent of local ownership among displaced local firms. The default assumption that is made is that 25 percent of the displaced local firms are locally owned. Therefore, the net extra multiplier from local ownership is equal to (gross local advantage multiplier) × (1 − export-base percentage) × (1 − share of local businesses among displaced businesses). For export-base firms, this is simply equal to 0.25 of the gross local advantage multiplier. For non-export-base firms, this local ownership advantage is equal to 0.25 × 0.75 = 0.1875.

Effects on Overall Wages and Housing Prices of Shocks to Employment

As explained in the main report, whatever shocks to employment occur due to initial incentive effects, multiplier effects, and other causes, they will have some effect on local wages and housing prices. These effects on wages and housing prices in turn will have some feedback effects upon employment. The report explains the main assumptions made. Here, we go over some details.

Based on a wide variety of estimates in a research literature reviewed in Bartik (2015), effects on real wages of labor demand shocks are significant. These effects are estimated to be somewhat persistent over time, but they do deteriorate over time, at about 13 percent per year. The magnitude of these effects does depend significantly on the unemployment rate that would otherwise prevail.

Because the research literature estimates are of elasticities, they estimate $\mathrm{dln}W/\mathrm{dln}E$. But the model developed here states effects as a linear dollar effect on wages in relation to jobs created. We can write $dW/DE = (\mathrm{dln}W/\mathrm{dln}E) \times (\mathrm{d}w/\mathrm{dln}W) \times (\mathrm{dln}E/\mathrm{d}E)$, which in turn equals $(\mathrm{dln}W/\mathrm{dln}E) \times (W/E)$.

Because this elasticity of wages depends upon the prevailing unemployment rate, we need to have a time series for the underlying unemployment rate. The baseline starts from some average unemployment rate and assumes the economy gradually over time adjusts back to "full employment." The baseline adjustment rate in the local economy is 10 percent per year.

Employment shocks may also affect the prevailing unemployment rate. However, these effects are ignored, as they will be a second order of small for incentive programs that are small relative to the overall economy.

In addition, the model assumes that the absolute change in wages each year depends upon the prevailing wage rate per worker. Therefore, we need a time series for that. We start out at the 2015 level of wages per worker, as measured by BEA over all industries. We then grow that level by 1.2 percent per year based on the projections of the Social Security Trustees.

The elasticities of wages are taken from the literature reviewed in Bartik (2015). The variation in elasticities at different unemployment rates is derived from the new estimates in Bartik. We take the first-year elasticity estimated at three different unemployment rates, and we use those to develop a simple equation that relates the elasticities to all unemployment rates. The baseline model adjusts these elasticities down so that they are consistent with an initial real wage elasticity of about 0.200 at the median unemployment rate in the Bartik study of 6.2 percent; 0.200 is about the average short-run real wage elasticity estimated in the research literature (Bartik 2015, Appendix). In addition, we assume that these elasticities deteriorate by a factor of 12.9 percent per year, based on the estimates in Bartik (2015, Table 1).

We base the average elasticity of property values with respect to employment on the effect on the original home-ownership price variable in Bartik (1991). This elasticity is 0.451. This is consistent with the inverse housing-supply elastic equations in Saiz (2010). Saiz estimates that demand shocks to the number of housing units have effects on housing prices that on a population-weighted basis correspond to an inverse housing-supply elasticity of 1.75. Taking 1 over this yields a housing price elasticity with respect to housing units of 0.571. We would expect a somewhat lower housing price elasticity with respect to employment, as demand shocks to employment will increase the ratio of employment to housing units.

Saiz also reports a range of elasticities for different metro areas that vary, due both to metro areas having more or less restrictive regulations on housing supply, and to metro areas having geographies that are more or less conducive to adding housing supply. What range of elasticities would it be reasonable to assume? Saiz looks at 95 metro areas. If we look at an approximate interval from the tenth to the ninetieth percentile, the tenth-least elastic housing supply is San Jose, California, and the eighty-sixth-least elastic housing supply is Greensboro, North Carolina. If we take 1 over the housing supply elasticity for these two cities, which will be the housing price elasticity with respect to shocks to housing unit demand, and then adjust downward by the ratio of the 0.451 average elasticity in Bartik (1991) to the 0.571 elasticity in Saiz, we get implied elasticities of housing prices with respect to employment of 1.038 in San Jose and 0.255 in Greensboro. In other words, there are local economies in which the housing price response to a labor demand shock to employment is more than twice the general average (1.038 versus 0.451), and there are metro areas in which the housing price response is a little more than half the general average (0.255 versus 0.451). This is a reasonable range of plausible housing price effects to consider.

We use a similar equation as was used above to figure out property-value effects per induced job—that is, to linearize the above elasticities. This requires calculation of average ratios of property values to jobs. We take aggregate data on property values for homeowners, for corporate businesses, and for noncorporate businesses from the Federal Reserve Flow of Funds reports, Tables B102, B103, and B104. We use the average value of the end of 2014 and end of 2015 to estimate the average value of such property in 2015, our baseline year. These values are then assumed to increase relative to baseline employment by 1.2 percent per year, to reflect real economic growth.

The property-value effects are used in part to determine capital gains for local property owners. For these calculations, we need to determine the change in property values from the prior year. In addition, for each class of property, we need to use some estimates of the percentage of property that is locally owned. The assumption made in the baseline is that local ownership is 100 percent of owner-occupied housing property, 10 percent of real estate owned by nonfinancial corporate businesses, and 50 percent of real estate owned by nonfinancial noncorporate businesses.

In addition, for both wages and housing prices, we need to determine their effects on costs, which will be used to determine feedback effects of these increased costs in reducing other private employment. For wages, this is straightforward: we simply use the annual increase in wages as the estimate of the increase in costs.

For real estate prices, we need to translate the increase in property values into some increase in annual rental costs. To do so, we need ratios of rental prices to owner prices for real estate. Although historically this has hovered around 5 percent, in recent years it has been lower (Davis, Lehnert, and Martin 2008). For capital gains brought about by a once-and-for-all shift in employment growth, it seems appropriate to use the long-run average of 4.90 percent that is reported by Davis et al., using Case-Shiller data, as there would be no reason that this boost to property values necessarily would result in a revision of long-run expectations of capital gains, which is what is probably driving down the rental-price-to-owner ratio in recent years.[118]

In addition, we would expect the increase in homeowner prices and private rental prices to increase overall local costs by more than the initial shock because of feedback effects upon nominal wages, which will further increase costs. In Aten (2006), who looks at rental price differentials across areas versus overall local price differentials, a rental price differential of x percent increases overall prices by about $0.50 \times x$ percent. Yet the share of housing prices in overall prices is only 29 percent. Some of this is due to increases in rental prices shifting up costs directly in locally oriented businesses. The estimated share of locally-oriented businesses in non-real-estate-related private business activity in local areas suggests the local share is about 48.8 percent.[119] Using data from the Federal Reserve Flow of Funds on real estate ownership of homeowners versus rental property owners versus other business owners, and the assumed local business share percentage of 48.8 percent, I calculate that total property owned by locally oriented businesses is 30.2 percent of the total value of housing property (owner-occupied plus rental). So, because of higher rental prices alone, we would expect the local price effect to be 30.2 percent greater than the housing price effect. Instead, it is 72.4 percent greater than the housing price effect (0.50 over 0.29 = 1.724). Therefore, the suggestion is that wage feedback effects multiply the direct rental price effects by about 32.4 percent (1.324 = 1.724 / 1.302). This is the blow-up factor that we apply to rental price increases to determine their overall cost effect.

For demand-side effects of changes in local wealth due to changes in local property values, we rely on evidence from Howard (2017), backed up by Berger et al. (2015), that the elasticity of consumption with respect to house prices might be 0.2. Some manipulation shows the following for the expected change in local employment:

$$(\mathrm{d}E/\mathrm{d}V_h) = (\mathrm{d}E/\mathrm{d}C_l) \times (\mathrm{d}C_l/\mathrm{d}C) \times (\mathrm{d}C/\mathrm{dln}C) \times (\mathrm{dln}C/\mathrm{dln}P_h) \times (\mathrm{dln}P_h/\mathrm{d}P_h) \times (\mathrm{d}P_h/\mathrm{d}(P_h{\times}H)) \ ,$$

where C_l is local consumption, C is overall consumption, E is employment, P_h is the price of housing, H is the quantity of housing, and V_h is the value of housing ($= P_h \times H$).

In the above equation, $(\mathrm{d}E/\mathrm{d}C_l)$ is how much employment goes up with an increase in local consumption. We assume this is 1 over average private value-added per FTE worker. $\mathrm{d}C_l/\mathrm{d}C$ is how much local consumption goes up for a $1 increase in overall consumption: we assume this is 0.5; $(\mathrm{dln}C/\mathrm{dln}P_h)$ is the elasticity mentioned above, which is assumed to be equal to 0.2.

118 The relevant Davis, Lehnert, and Martin data can be downloaded at the Land and Property Values section of the website of the Lincoln Institute on Land Policy.

119 This 48.8 percent is the percentage of locally oriented businesses in private value-added, excluding the real estate sector, derived from 2015 BEA data. The definition of export-base industries is the full set of 45 such industries defined in Bartik (2017a).

This ends up being (1/*VA* per private-sector worker) × 0.5 × (*C*/*V*).

So, we need to know the ratio of consumption to local real estate wealth, or *C*/*V*. From our real estate calculations based on the Federal Reserve Board's (2016, 2017) data, we get that in 2015 local real estate wealth in the United States averaged $27.4 trillion. Personal consumption expenditures in the United States in 2015 were $12.3 trillion. The ratio is 0.448. The ratio of value-added to FTE jobs for the private sector was about $140,000 in 2015 and is simulated to grow at 1.2 percent per year in our model. That means the first factor is 1/$140,000 in the first year.

We assume that demand feedback adjustments from the housing price increases take place with a one-year lag, to avoid simultaneity complications.

Employment Feedback Effects of Increased Wages and Rental Costs

These increased costs from higher real wages, and from higher rental costs of real estate (including feedback effects through higher local prices and higher local nominal wages), will tend to reduce overall employment. The main text explains how these adjustments are done.

One detail is that in implementing the model, we assume that the long-run adjustment is toward the long-run equilibrium implied by last year's boost to costs. This introduces a further one-year lag into the model and assumes that business decision makers observe cost changes and then react in their next year's decisions to last year's costs. One reason for making this assumption is that it reduces the simultaneity in the model. Employment in the model immediately affects wages and housing prices, and if those price changes in turn immediately affect employment, the model becomes more complicated to solve. However, it seems plausible to introduce some lags in response, and a one-year lag in overall business activity response does not seem unreasonable. Once employment is reduced because of increased costs, this in turn dampens the increased costs through a feedback effect.

As we have done previously, we linearize the model to get simple multipliers. The effect of a dollar change in costs on the number of jobs can be written as $dE/dC = (d\ln E/d\ln C) \times (E/C)$. We merely weight the elasticity by the ratio of employment to costs, where costs are considered to be value-added.[120] We consider the relevant ratio to be the ratio of FTE for all private industries to value-added for all private industries. In doing these calculations, we assume that the initial ratio in Year 1, which is taken from BEA data for 2015, then increases each subsequent year by 1.2 percent because of the assumed long-run U.S. growth rate in overall wages and productivity, derived from the report of the Social Security Trustees.

A footnote to the text asserts that Beaudry, Green, and Sand (2014) imply a long-run labor demand elasticity of about −1.5. This is derived from their IV estimates in column (2) of Table 3. These estimates are for a 10-year elasticity. I assume the relevant labor demand elasticity is an elasticity that allows population to vary. In Bartik (2015), the mean implied 10-year elasticity of population with respect to demand shocks to employment at the mean unemployment rate is about 0.665.

120 One detail is that we consider last year's increment to wage costs and effective rental costs, and therefore we weight by last year's ratio of employment to costs.

This implies a 10-year elasticity of about −0.27 (Beaudry et al. coefficient on wages) minus 0.665 times 0.96 (Beaudry et al. coefficient on city working-age population), or −0.908. If one assumes adjustment of 0.089 per year toward the long-run equilibrium, based on Helms (1985), then the 10-year adjustment will be about 60.9 percent of the long-run adjustment. This implies a long-run elasticity of −1.49.

Demand Effects Due to Opportunity Cost of Funds

The funds used to finance the incentives must come from either increased state and local taxes or decreased state and local spending, given balanced budget multiplier effects. In addition, later in the model, any fiscal benefits or costs from the economic development created by the incentive must also be financed in some way. The demand-side effects of spending cuts and tax increases are described in the main text and are straightforward. The methodology in moving from the estimates of Suarez Serrato and Wingender (2016) and Zidar (2017) to the actual estimates here, which are costs of creating or destroying one job in 2015 dollars, is described fully in Bartik (2017b). The initial 2015 costs, in Year 1 of the simulation, are then increased annually for the next 80 years by 1.2 percent per year.

If the tax incentive is financed by increases in household taxes, the calculated demand-side feedback effects on jobs combines the estimates from Zidar (2017), adjusted as shown in Bartik (2017b), along with data from the Congressional Budget Office, Ernst and Young, and the Institute on Taxation and Economic Policy. (ITEP). First, data from Ernst and Young is used to determine the business-tax share of any tax increase (Phillips, Sallee, and Peak 2016). This business-tax share is 44.1 percent. Then, we determine what share of business taxes and nonbusiness taxes at the state and local level are paid by the bottom 90 percent of the state income distribution, and what share by the top 10 percent. This focus on the bottom 90 percent versus the top 10 percent is based on Zidar's finding that tax changes for the top 10 percent have no demand-side effects on state economies and jobs, whereas tax changes for the bottom 90 percent have sizable effects.

For business taxes, we use CBO income distribution data to determine that the top 10 percent of the income distribution gets 80.7 percent of all capital income. This is based on Table 6 in CBO's supplemental data to CBO's June 2016 report (CBO 2016). The broad capital income calculation here includes CBO's narrow capital income category, plus capital gains, plus business income, plus the portion of the corporate income tax that CBO assumes is borne by capital.

For nonbusiness taxes, we look to the income distribution tables done by ITEP in their 2015 book (ITEP 2015). We exclude the nonhousehold categories, and from Phillips, Sallee, and Peak (2016), we use their estimate that 10.4 percent of state and local personal income tax collections are on pass-through business income, and so we only use the remaining 89.6 percent of the personal income tax in the household tax calculations. We use ITEP's figures for the distribution of nonbusiness taxes. ITEP breaks the income distribution at the eightieth percentile and the ninety-fifth percentile. We assume the ninetieth percentile share is halfway in between the eightieth percentile and the ninety-fifth percentile (not two-thirds, because of the skewed income distribution). The eightieth and below percentile share of nonbusiness state and local taxes averages 45.4 percent of all state and local nonbusiness taxes, and the ninety-fifth percentile and below averages 71.1 percent of all state and local nonbusiness taxes, so the simple average share for the bottom 90 percent is assumed to be 58.2 percent.

The resulting calculations then allow us to calculate nonbusiness taxes on the bottom 90 percent and top 10 percent, and business taxes on the bottom 90 percent and top 10 percent. Zidar finds that tax changes on the top 10 percent have zero demand-side effects on state economies, and we adopt that assumption by assuming essentially an infinite cost per job created and destroyed for tax changes on this group. For the bottom 90 percent, he finds relatively low costs per job created and destroyed. We take his number and translate the figures into 2015 estimates per FTE job, as described more fully in Bartik (2017b). This initial 2015 figure is then allowed to grow annually for the next 80 years by 1.2 percent per year.

These demand-side effects may include some supply-side effects if changes in personal taxes or changes in spending on various programs (e.g., child care programs) lead to immediate supply-side effects on the quantity of labor supply or on labor productivity. However, these fiscal offsets clearly do not include other supply-side effects of financing that are longer term, such as the effects of higher business taxes on long-run business activity, or the effects of lower education spending on long-run labor productivity and wages. These long-run supply-side effects are allowed for separately below.

Supply-Side Effects Due to Higher Business Taxes

If the incentive program is financed from higher business taxes, these higher business taxes will have some long-run effects on job creation decisions. We assume that the change in business taxes, as a percentage of average value-added per job in the private business sector, leads to a long-run change in employment equal to some multiple, where that multiple is the same as what is used to ascertain the direct effects of incentives on incented businesses. The difference here is that the value-added per FTE job in the private business sector will tend to be lower than for export-base businesses. Also, we assume that higher business taxes do not have multiplier effects, as the estimated elasticities already take such multipliers into account. The model also allows for value-added per FTE job in the private business sector to grow over time, at a rate of 1.2 percent annually.

Supply-Side Effects Due to Lower Public-School Spending

If the incentive costs, and any other fiscal effects, are financed by spending cuts, these cuts may include cuts to public school spending. We allow for those public-school spending cuts to have supply side effects by affecting worker productivity and wages of workers who grew up attending public schools, are still alive, and remain in the state economy.

The default percentage of spending cuts that go to public schools is assumed to be the average percentage of total state and local public direct general expenditures that go to K–12 education. This percentage was 22.1 percent as of 2014.[121]

121 This is the K–12 share of all direct general *operating* expenditures. Including capital expenditures, the K–12 share is 21.4 percent.

I use the estimates derived by Jackson, Johnson, and Persico (2016) as the default effects of education on earnings. Specifically, their preferred estimates suggest that the elasticity of the natural log of the wage-rate ages 20–45 with respect to a log change in per-pupil expenditure is 0.7743. This is for all income levels. The effect for the nonpoor is 0.5525, and this would be a possible value if one thought that this group would dominate in the aggregate numbers. Also, one could support lower numbers, as Jackson, Johnson, and Persico's numbers are derived in part from court orders to help low-income schools (as well as from other court orders dealing with the adequacy of K–12 spending), and it is certainly plausible that the returns to spending increases in general might be lower than the returns to spending increases for low-income schools. Therefore, the model also includes a variable enabling this sensitivity to school spending to be adjusted downward.

Jackson, Johnson, and Persico's numbers are for effects of a given increase in expenditure for 13 years of schooling. We assume that the effects of merely changing one year of schooling are one-thirteenth as great.

In calculating our estimates, we first consider the effects of just changing spending in one year. That change affects 13 different cohorts—those in kindergarten, first grade, and so on up through twelfth grade. Each of them, because of the change in per-pupil spending by *x* percent, will experience a percentage earnings effect that is one-thirteenth as great as the 0.7743 effect. I assume that this effect occurs evenly throughout the person's lifetime, at all ages, even though there is some evidence (see Jackson, Johnson, and Persico) that the effects might grow over time. In addition, the fact that effects are growing over time may imply that using Jackson, Johnson, and Persico's numbers to predict lifetime effects may understate effects, as we are missing some of the prime earning years after age 45.

The Jackson, Johnson, and Persico estimates already implicitly adjust for some individuals not attending public school, so we do not need to further control for that variable. However, in looking at effects on state earnings, we need to allow for mortality and outmigration. Hence, for each of the 13 cohorts, we will allow for the probability of surviving to a given age, and the probability of living elsewhere than the state one lived in at a particular age. The survival probabilities will be calculated by averaging the male and female survival probability to age *a*, compared to the initial age of this intervention. The probability of living elsewhere is based on the percentage of persons living in their birth state at age *a* compared to the initial age of this intervention. These two probabilities will be multiplied by the number showing the effect of public school spending on all persons unconditional on whether the person survives or on what state they end up in.

We want to get a set of dollar numbers showing the change in dollar earnings by year for a change in public school spending by year, or

$\mathrm{d}E_{ca}/\mathrm{d}P_t$.

Without changing anything, this can be rewritten as the effect on an individual's earnings, so we can redefine E_{ca} as earnings per person at age a for cohort c, and P_t as public-school spending per person.

We can then rewrite this as $\mathrm{d}E_{ca}/\mathrm{d}P_t = (\mathrm{dln}E_{ca}/\mathrm{dln}P_t) \times E_{ca}/P_t$. $\mathrm{dln}E_{ca}/\mathrm{dln}P_t$ is the elasticity parameter estimated by Jackson, Johnson, and Persico, divided by 13. E_{ca} is the average earnings at a particular age of a typical person. P_t is public-school spending per pupil.

We get E_{ca} by first obtaining a cross-sectional set of observations on earnings by single year of age from the American Community Survey (ACS) for 2015. We then adjust this to make it expected future earnings by assuming for each cohort from 2015 that their earnings at a given age will grow in real terms by 1.2 percent annually from their current age to the age at which they would receive that cross-sectional earnings.

We get P_t as public-school spending per pupil as of 2015.

We calculate this separately for each of 13 cohorts for their entire working career. We then multiply the actual numbers for each cohort by their survival and staying probabilities for each age. We then have a series of numbers, when we sum across the 13 cohorts, for the dollar change in earnings in each future year that can be expected because of a dollar change in public school spending in the initial year, 2015.

What do we do with these numbers for subsequent years? Earnings will grow over time, at 1.2 percent per year. But on the other hand, one might assume that per-pupil spending in the long term might grow by 1.2 percent per year. The net result is that I decided to use the same set of multipliers for all years.

Finally, the numbers for each year may be subject to an educational spillover multiplier. We assign such a spillover based on Moretti's numbers on such spillovers. This is used to multiply all the numbers.

The practical complexity of this model is that for each year we must construct a separate set of earnings multipliers for each of 13 cohorts, as the growth in earnings, mortality, and moving behavior for each of the 13 cohorts will differ. We then sum over 13 cohorts to get effects per dollar on earnings for each of 80 subsequent years of history. This is then multiplied by the dollar change in education funding to get actual effects on earnings. Then for each year of the simulation, we need to apply the dollar change in education spending to the vector giving the dollar change in earnings per dollar of education spending for each year, to get subsequent changes in earnings.

For the staying probabilities, we use data from the 2000 Census PUMS on the percentage of people living in their birth state as of different ages, and take ratios of the percentage living in their birth state at age *a* to the percentage living in their birth state at the assumed earlier age. Comparison of this with data from the Panel Survey of Income Dynamics (PSID) data on staying shows that this matches reasonably well at younger ages, but tends to slightly overestimate staying at later ages. However, given that U.S. internal mobility has fallen in recent years, this overstatement of staying relative to 2000 may lead to more accurate staying predictions.

The net result of all this is a vector of changes in earnings in the state economy due to changes in education funding. In the model, this is treated as directly occurring solely because of changes in wages, so jobs do not directly change. However, there will be indirect changes in jobs due to demand-side effects of the change in wages.

To implement these demand-side changes, we assume that the estimates by Zidar (2017) of the demand-side effects of taxes can be used to determine the demand-side effect of changes in wages. Zidar's estimates imply that only changes in the net income of the bottom 90 percent of the income distribution matter in affecting local jobs. The initial multiplier effect from Zidar implies that initially, in 2015 dollars, each $39,177 reduction in wages for the bottom 90 percent due to education cutbacks (or increase in wages due to education spending expansions) will destroy (or create) one job. This Zidar multiplier is increased by 1.2 percent for each subsequent year of the model, to reflect secular economic growth in productivity and wages. To determine what share of the wage changes due to education cutbacks (or education expansions) go to the bottom 90 percent, we use data from the CBO that show that 91.54 percent of households with children are in the bottom 90 percent of the income distribution. This allocation of education's wage effects by the count of households with children is consistent with how the effects of education on wages are divided by income quintile, as will be discussed later in this appendix.

Effects of Incentives to Local Business Owners on Local Demand

In the baseline scenario, all incentives are assumed to be provided to businesses owned outside the local area. These incentive dollars, and whatever effect they have on business profits, may affect business location decisions, but are assumed to be respent outside the local economy. Therefore, these incentive dollars do not have direct demand effects on the local economy.

But in some alternative scenarios, the incentives are provided to local business owners. These incentives will have some effect on business profits. If local business owners did not respond at all to incentives, the increase in their profits will simply be equal to the dollar cost of the incentives, times the assumed ratio of incentive effectiveness to dollar costs. But in general we expect incented businesses to respond by expanding employment and output. If there is an upward sloping business supply curve of output and/or a downward sloping labor demand curve, this expansion raises costs of the firm. To calculate the increase in profits, we treat the incentive as if it lowers the effective cost of labor. The firm's labor demand then expands in response to the lower cost. The gain in profits is the area to the left of the labor demand curve, between the old and new labor cost lines. This differs from the incentive cost times its effectiveness by an area that would be a "Harberger triangle." That is, if one makes the simplifying assumption that the labor demand curve is linear, the adjustment cost reduces the profit gain by one-half the change in costs times the change in jobs. We make this simplifying assumption.[122]

In practice, I calculate this Harberger triangle area by multiplying the (incentive cost times service effectiveness) per FTE worker times (the change in the number of workers due to the incentive) times one-half. This adjustment is small if the incentive is assumed to only induce a small percentage of the incented jobs. In general, the adjustment as a percentage of incentive costs times the incentive effectiveness ratio will be one-half the percentage of incented jobs that are actually induced.

122 One could instead assume the labor demand curve is log-linear, but this would require numerically integrating the appropriate area, which seems an unnecessary complication for modest gains in computational accuracy. And since we are not sure of the true functional form of labor demand, any assumed functional form may be in error.

What effect does this change in profits have on local demand? Based on Zidar's research, I assume that such income increases only have demand effects to the extent to which this change in profits is received by business owners in the bottom 90 percent of the income distribution. Some scenarios assume that the incentive payments to local business owners are distributed across the income distribution in the same way as capital income is distributed across the income distribution, based on CBO (2016). According to CBO, 78.9 percent of capital income goes to the top 10 percent of the income distribution, and 21.1 percent of capital income goes to the bottom 90 percent of the income distribution. In other scenarios, the distribution of incentive payments across the distribution is assumed to be alterable by incentive policy. In particular, I consider scenarios where only 10 percent of incentive payments go to local business owners in the top 10 percent of the income distribution. Obviously, these assumptions make a tremendous difference: in the CBO case, only 21.1 percent of any change in profits of local business owners affects local demand, but in the other case, 90 percent of the change in profits of local business owners affects local demand.

The local demand effect is assumed to be given by Zidar's results. Specifically, I assume that in Year One, each $x increase in profits of local business owners in the bottom 90 percent of the income distribution due to incentive payments increases local demand sufficiently to increase FTE local jobs by $x divided by $39,177. The $39,177 figure in Year One for the dollar-demand-to-FTE-job-creation ratio is inflated each year by 1.2 percent to reflect long-run economic growth trends.

Effects on Labor Force Participants, Unemployment, Full-Time Employment, and Employment of Local Residents, Population of Employed New Residents, and Overall Population

We next see what effect the overall demand shock to employment, resulting from all these changes, has on the number of local residents who are labor force participants, the number of unemployed, the number of local residents who are full-time employed or employed at all, the number of new residents who are employed, and the overall population.

Because effects are stated as full-time-equivalent employment (FTE), what we are trying to determine are $dLFP/dF$, dU/dF, dF_1/dF, dE_1/dF, dP_w/dF, and dP/dF, where F is total FTE in the state, LFP is the number of labor force participants among local residents, U is the number of unemployed local residents, F_1 is the full-time-equivalent level of local residents holding jobs, E_1 is the number of local residents holding jobs, P_w is the population of new residents holding jobs, and P is the total population including new residents. In addition, we define the labor force participation rate among local residents as $LFPR = LFP/POP$, and the unemployment rate among local residents as $UR = U/LFP$. We also note that total employment, not just full-time-employment, can be written as $E = LFPR \times (1 - UR) \times POP$.

To begin with, we calculate the change in local residents who are labor force participants and who would then be expected to be employed at the prevailing unemployment rate. This is

$$d[LFPR(1\text{-}UR)POP]/dF = (d\ln LFPR/d\ln E) \times (1\text{-}UR) \times POP \times (d\ln E/d\ln F) \times (LFPR/F) .$$

We assume $(d\ln E/d\ln F)$ equals one (total employment and total FTE employment expand by the same percentage). This expression then simplifies to the labor force participation elasticity (the first term, or dln*LFPR*/dln*E*) times the ratio (*E*/*F*).

The labor force elasticity term will depend upon the initial unemployment rate. The results from Bartik (2015) imply an equation in which this elasticity varies with the initial unemployment rate. The elasticity at the mean unemployment rate of 6.2 percent will be 0.232, meaning that the labor force participation rate increases enough that at that unemployment rate, 232 out of every 1,000 new jobs will go to local residents who otherwise would not be in the labor force. The elasticity at a higher unemployment rate of 10 percent will be 0.389, meaning that at that unemployment rate, 389 out of every 1,000 new jobs will go to local residents who otherwise would not be in the labor force.

This elasticity varies over time and with the unemployment rate. Therefore, the effect of a shock at time t0, as of some later time t1, is assumed initially to be the number of jobs created at time t0 times the appropriate elasticity, given the unemployment rate, at time t1.

The empirical research literature does not find huge depreciation of labor force participation rate effects over time, say for 5 or 10 years (Bartik 1991, 2015). However, it seems absurd to think that labor force participation rate effects of an initial shock to some population continue forever, even as that original population leaves the state, drops out of the labor force as it ages, or dies.

Therefore, we allow these labor force participation rate effects to depreciate over time. This depreciation is based on reasonable assumptions about labor force participation patterns, migration, and survival. To derive the appropriate depreciation percentages, I use data from the American Community Survey for labor force participation rates for the nation, for each year of age from ages 16 to 80 for 2015, along with the same staying and survival data used above for calculating the long-run effects of education spending. The idea here is that the long-run effects on labor force participation of a one-time job shock are due to permanent human capital effects on the persons in the state as of the year the shock takes place. The size of this shock's implications for overall labor force participation rates depends upon how many of the original residents stay in the state, how many survive, and their likely labor force participation rate based on their age distribution.

For each individual year of age cohort c of local residents, the change in employment due to labor-force-participation-rate effects of some shock to FTE employment as of some later date will be as follows:

$\mathrm{d}LFPR_c(1\text{-}UR)(POP_c)/\mathrm{d}F$, where $\mathrm{d}LFPR_c$ is the change in labor force participation rates for that cohort as of some later date, and POP_c is the population of that cohort that remains in the state as of that later year, accounting for out-migration and deaths.[123] We can rewrite this cohort-specific effect on employment of local residents as

$$\mathrm{d}LFPR_c(1\text{-}UR)(POP_c)/\mathrm{d}F= [(1\text{-}UR)/F] \times (\mathrm{dln}LFPR_c/\mathrm{dln}E) \times POP_c \times (\mathrm{dln}E/\mathrm{dln}F) \times LFPR_c .$$

As before, we assume that (dln*E*/dln*F*) equals one, so that term goes away.

If we assume the labor force participation rate elasticity is constant across cohorts, then we can

123 I implicitly assume that the unemployment rate is the same for all cohorts.

write the following expression for the sum of this term across cohorts, where the summations are across all age cohorts c from initial age 16 to age 79:

$$\sum \mathrm{d}LFPR_c(1\text{-}UR)(POP_c)/\mathrm{d}F = [(1\text{-}UR)/F] \times (\mathrm{dln}LFPR/\mathrm{dln}E) \times \sum[POP_c \times LFPR_c] .$$

In the initial time period, the population is the original population of the area for each age cohort, and the labor force participation rate is whatever labor force participation rate each age cohort has. In the next year, the age cohort ages by one year. There is some probability that each age cohort remains in that same state. We ascertain that probability by using the Census PUMS from 2000 to calculate the ratio of the proportion living in their birth state at age a0 + 1 to the proportion living in their birth state at age a0. (As mentioned above in discussing the education calculations, this ratio is close to the net proportion staying in their childhood state for the same persons followed from one year to the next that is estimated in the Panel Survey on Income Dynamics.) There is some probability of death from one year to the next for the persons in each age cohort. . We ascertain that probability by using the U.S. Life Tables to calculate the ratio of the proportion surviving to age a0+1 compared to the proportion surviving to age a0. We multiply these two ratios or two probabilities by the original population of each age cohort to get the estimated surviving population in that state one year later. The baseline labor force participation rate for that age cohort c in the next year is ascertained by using the ACS 2015 to estimate the labor force participation rate at that one-year-later age. Finally, we sum the product of these estimated surviving and staying populations and labor force participation rates of each age cohort to get $\sum[POP_c \times LFPR_c]$ one year later. We then take the ratio of this summation to the similar summation for the first year to get a ratio. We do the same calculation for each subsequent year. We then, for each subsequent year, get a cumulative probability by multiplying these ratios together.

Appendix Table C1 shows the underlying data.

The population data shows that initially the younger cohorts dominate, although obviously as the population ages, the younger cohorts go away and the older cohorts dominate. The survival data shows some slight death rates at earlier ages, accelerating at later ages, so this variable tends to lead to slight depreciation of the labor force participation rates at first, but accelerates much more as the cohorts age. The “birth-state” staying variable shows some initially greater out-migration in the more populous younger cohorts, so this variable tends to contribute to greater depreciation of the labor-force-participation-rate effects at first, and somewhat lower depreciation later. However, the birth-state staying variable never shows very great depreciation from year to year or even over a cumulative number of years. Finally, the labor-force-participation-rate variable at first contributes to some mix of appreciation and depreciation, as at first some of the younger and more populous cohorts tend to have increasing labor force participation rates. However, later, as the entire age distribution of the original local residents age, the labor-force-participation-rate variable leads to much more severe depreciation, as older cohort labor force depreciation rates head dramatically downward.

Table C1 Inputs into Calculating Persistence of Shocks to Labor Force Participation

Age	Population of cohort in millions, based on 2015 ACS	Survival rate (as % of those born)	Staying in birth state rate (%)	Labor force participation rate (%)
16	4.203	99.1	78.7	17.4
17	4.159	99.1	79.0	30.2
18	4.531	99.0	75.4	45.8
19	4.175	99.0	72.3	58.5
20	4.644	98.9	72.1	66.3
21	4.618	98.8	71.0	70.4
22	4.524	98.8	70.1	75.6
23	4.443	98.7	69.3	79.5
24	4.412	98.6	68.5	81.1
25	4.804	98.5	66.8	82.1
26	4.498	98.4	66.2	82.5
27	4.383	98.3	65.7	83.1
28	4.317	98.2	65.0	82.9
29	4.238	98.1	64.4	83.2
30	4.608	98.0	63.7	83.0
31	4.200	97.9	63.5	82.7
32	4.303	97.8	63.6	82.9
33	4.248	97.7	63.6	82.7
34	4.226	97.6	63.6	82.4
35	4.498	97.4	63.0	82.0
36	4.121	97.3	62.5	82.2
37	4.013	97.2	62.3	82.2
38	4.035	97.0	62.6	83.2
39	3.891	96.9	62.4	82.4
40	4.221	96.7	62.3	82.3
41	3.812	96.6	62.0	83.0
42	4.031	96.4	62.0	82.6
43	4.069	96.2	61.7	82.5
44	4.308	96.0	61.6	82.8
45	4.459	95.7	60.9	82.7
46	4.103	95.5	60.7	82.3
47	4.009	95.2	60.4	82.0
48	4.056	94.9	60.2	81.5
49	4.195	94.5	59.8	81.1
50	4.620	94.2	59.6	79.9
51	4.349	93.8	59.4	79.8
52	4.485	93.3	58.5	78.8
53	4.428	92.8	58.1	77.5
54	4.440	92.3	57.0	77.3

Table C1 (continued)

Age	Population of cohort in millions, based on 2015 ACS	Survival rate (as % of those born)	Staying in birth state rate (%)	Labor force participation rate (%)
55	4.552	91.8	56.0	75.5
56	4.335	91.2	56.4	73.9
57	4.312	90.6	56.8	72.4
58	4.271	89.9	57.5	71.0
59	4.102	89.2	56.8	69.1
60	4.254	88.4	57.4	65.2
61	3.907	87.6	57.2	61.8
62	3.842	86.7	57.7	55.8
63	3.719	85.8	57.2	50.2
64	3.554	84.8	57.5	46.2
65	3.496	83.8	57.3	39.2
66	3.320	82.7	57.6	34.1
67	3.335	81.6	57.6	30.0
68	3.347	80.3	57.8	27.4
69	2.602	79.0	57.9	24.6
70	2.549	77.6	57.8	21.6
71	2.398	76.0	57.7	19.0
72	2.431	74.4	57.9	17.6
73	2.173	72.6	57.5	15.8
74	1.948	70.7	57.7	14.8
75	1.833	68.7	57.7	12.7
76	1.717	66.6	57.4	11.3
77	1.651	64.3	57.5	9.4
78	1.536	61.8	57.2	8.5
79	1.409	59.2	57.4	7.9

NOTE: Population numbers are sum of person weights from 2015 American Community Survey.
Survival rates are proportion of population surviving to various ages, from U.S. Life Tables.
Proportion living in birth state are figures from 2000 U.S. Census.
Labor force participation rates are weighted averages calculated from unallocated data in 2015 American Community Survey.

Appendix Table C2 shows the resulting assumptions about the year-to-year and cumulative depreciation rates of the labor force participation rates, based on the combined effects of populations aging and as a result of sometimes leaving the state, dying, or dropping out of the labor force.

The year-to-year depreciation rates are only 1 percent from Year 1 to Year 2, gradually increase to 3 percent in Year 10, 4 percent in Year 20, 5 percent in Year 30, 8.5 percent in Year 40, and then more dramatically to 15 percent in Year 50 and 26 percent in Year 60. The cumulative depreciation rate is only 1 percent from Year 1 to 2, but goes up to 18 percent at Year 10, 42 percent at Year 20, 63 percent at Year 30, 82 percent at Year 40, 95 percent at Year 50, and 99 percent at Year 60. The model ends up with a result that can be reconciled both with the empirical literature and with common sense. Consistent with the empirical literature, labor-force-participation-rate effects of labor demand shocks do not depreciate much for the first 10 years or so, but then depreciate almost

Table C2 Year-to-Year Changes in Labor Force Participation of Surviving and Staying Population, and Cumulative Changes in Labor Force Participation

Year	Year-to-year ratio of human capital of surviving and staying population at Year t compared to Year t − 1	Cumulative total human capital of surviving and staying population at Year t, ratio to Year 1
1	1.0000	1.0000
2	0.9909	0.9909
3	0.9867	0.9777
4	0.9823	0.9604
5	0.9790	0.9402
6	0.9762	0.9178
7	0.9747	0.8947
8	0.9727	0.8702
9	0.9711	0.8451
10	0.9700	0.8197
11	0.9693	0.7945
12	0.9688	0.7697
13	0.9677	0.7448
14	0.9673	0.7205
15	0.9667	0.6964
16	0.9659	0.6727
17	0.9653	0.6493
18	0.9641	0.6260
19	0.9633	0.6030
20	0.9623	0.5803
21	0.9613	0.5578
22	0.9604	0.5357
23	0.9593	0.5139
24	0.9573	0.4920
25	0.9563	0.4705
26	0.9543	0.4490
27	0.9527	0.4277
28	0.9508	0.4067
29	0.9489	0.3859
30	0.9466	0.3653
31	0.9440	0.3448
32	0.9421	0.3249
33	0.9393	0.3052
34	0.9366	0.2858
35	0.9334	0.2668
36	0.9298	0.2480
37	0.9262	0.2297
38	0.9228	0.2120
39	0.9192	0.1949

Table C2 (continued)

Year	Year-to-year ratio of human capital of surviving and staying population at Year t compared to Year t − 1	Cumulative total human capital of surviving and staying population at Year t, ratio to Year 1
40	0.9150	0.1783
41	0.9104	0.1623
42	0.9048	0.1469
43	0.8977	0.1319
44	0.8893	0.1173
45	0.8820	0.1034
46	0.8733	0.0903
47	0.8671	0.0783
48	0.8620	0.0675
49	0.8594	0.0580
50	0.8516	0.0494
51	0.8512	0.0421
52	0.8511	0.0358
53	0.8477	0.0303
54	0.8390	0.0255
55	0.8302	0.0211
56	0.8195	0.0173
57	0.8167	0.0141
58	0.7977	0.0113
59	0.7794	0.0088
60	0.7422	0.0065
61	0.7116	0.0046
62	0.6744	0.0031
63	0.5968	0.0019
64	0.4735	0.0009
65 and after	0	0

The year-to-year probability measures the total labor force participation of the surviving and staying population in year t versus year t − 1, based on the assumed age-specific staying and surviving and labor force participation probabilities, and the estimated age distribution of the original population for each year of the simulation.
The cumulative probability measures the total labor force participation of the initial population at Year 1 that survives and stays to Year t, compared to Year 1, as measured by total expected labor force participation of the survivors and stayers at Year t as a ratio to total expected labor force participation at Year 1.

completely as the original population either leaves the state, drops out of the labor force, or dies, with this depreciation accelerating over time.

The unemployment-rate changes from a demand shock are derived more simply. The effect of a labor-demand shock is assumed to decay log linearly from the initial shock.

We derive that

$$dU/dF = (d\ln(LFP-U)/LFP)/d\ln E) \times (d\ln E/d\ln F) \times (d\ln F/dF) \times (dU/d\ln((LFP-U)/LFP).$$

The second term is assumed equal to 1. (FTE and all employment grow at the same percentage rate.)

We can then reduce this equation to

= (first elasticity term) × ($-E/F$).

The first elasticity term will vary with both the prevailing unemployment rate and the length of the time since the growth shock.

We use the estimates underlying Bartik (2015) to estimate effects on unemployment. These models imply that the initial effect of a shock to employment at 6.2 percent unemployment is an elasticity of about 0.476. This elasticity means that for every 1,000 new jobs created, 476 go to local residents who otherwise would be unemployed.. This elasticity goes up to 0.586 at 10 percent unemployment. This initial elasticity, because of a shock, decays at 27 percent per year—that is, each year the elasticity with respect to the shock is about 0.729 of the year before. We assume that the elasticity varies with both the current unemployment rate and the years since the shock, so that the actual elasticity in any given year for a given growth shock is equal to the appropriate elasticity for the current unemployment rate, times 0.729 taken to the number of years since the shock.

From the shock to full-time employment, we can infer the shock to employment, assuming both are the same percentage. By subtracting the change in local non-labor-force participants taking jobs, and the change in the local unemployed taking jobs, we get the change in the number of in-migrant workers taking jobs. By subtracting this from the change in employment, we get the change in local workers taking jobs. Then we can adjust back to the change in FTE local workers. Finally, from the ratio of U.S. population to workers, we can infer the change in overall population that corresponds to the change in the number of in-migrant workers. (This implicitly assumes that both adjust locally by the same percentage).

Wage Premia Effects

The wage premia calculations are described adequately in the main report.

Fiscal Benefits or Costs

Fiscal benefits or costs are based upon observing what happens to per capita income and population, and how this affects various tax bases and spending needs.

To generate this, we first must measure the increase in personal income. We assume the elasticity of the boost to personal income in response to the change in employment is 1.0. Therefore, the change in personal income per job is simply equal to the ratio of personal income to total FTE. We begin with the 2015 level of this and then inflate it by 1.2 percent in real terms per year. Both personal income and FTE figures are taken from the Bureau of Economic Analysis.

The general revenue categories we consider separately are federal intergovernmental revenue, property taxes, sales taxes, personal income taxes, and then all other revenue. “All other revenue” consists of other taxes (corporate income taxes) as well as fees that support general functions. All dollar figures for revenue and expenditure categories are the averages over all state and local governments from the Census of Governments in FY 2014, but adjusted to 2015 dollar values using the CPI−U−RS, and then allowed to increase from Year 1 to Year 80 by 1.2 percent per year in real terms. The 2014 figures are used because these are the latest data available.

Federal intergovernmental revenue is assumed to go up proportionately with population. Therefore, we assume d*Fig*/d*Pop* = (*Fig*/*Pop*), where *Fig* is federal intergovernmental revenue.

Based on Anderson and Shimul (2012), the property tax elasticity with respect to personal income is assumed to be 0.860. Therefore, (d*Prop tax*/d*Y*) = 0.860 × (*Prop tax*/*Personal income*). The last ratio is assumed to stay the same over time, as both property tax revenues and personal income are assumed to grow at the same 1.2 percent rate annually.

Based on Bruce, Fox, and Tuttle (2006), we assume the elasticities of all the sales tax categories are 0.811. (Technically speaking, their estimates only apply to the general sales tax, but we assume similar results for all sales tax categories.) Therefore, (d*Sales Tax Revenues*/d*Y*) = 0.811 (*Sales tax revenues*/*Personal income*). Again, we use the 2014 ratio for all years for the last term, due to assuming the same growth rate of both sales tax revenues and personal income over time.

Based also on Bruce, Fox, and Tuttle, we assume that the elasticity of personal-income tax revenues with respect to personal income is 1.832, so (d*PIT*/d*Y*) = 1.832 × (*PIT*/*Y*).

For all other revenue categories, we assume growth similar to sales tax revenues, so we get

d*Other Revenue*/d*Y* = 0.811 × (*Other revenue*/*Y*).

Finally, we allow for the possibility that property tax revenue effects may be greater if property wealth increases more with a shock to job growth. The overall elasticity of property tax revenue with respect to personal income is assumed to incorporate a variety of property tax effects of increased personal income: effects of additional population, effects of higher income on average housing spending, effects of job shocks on average property values. We assume that the Anderson and Shimul estimates reflect the average effects that occur when job shocks have average effects on housing prices, at a 0.451 elasticity of housing prices with respect to employment. We calculate the change in housing price effects of property values that would occur if job growth has effects different from 0.451. Therefore, the difference in property wealth effects that occurs because of housing-price-effect differentials that stem from differences between the assumed elasticity and an elasticity of 0.451 are added in as additional property wealth increases. We assume that an elasticity of property tax revenue with respect to this added or subtracted property wealth due to differential elasticities is 1.0. Therefore, the increase in property taxes with respect to a dollar increase in wealth, (d*PROPTAX*/d*PROPWEALTH*), equals (*PROPTax*/*PROPWEALTH*). We use a 2014 ratio for this and assume that it applies forever. All these calculations only play a role in the model when the effects of employment on housing prices are allowed to deviate from its baseline assumption of a 0.451 elasticity.

For all direct general expenditure categories, we assume an elasticity with respect to population of 1. We therefore get (d*DGE*/d*POP*) = (*DGE*/*POP*), where *DGE* is direct general expenditure and

POP is population. We start out with this ratio for 2015 and then assume it goes up by 1.2 percent per year to reflect growth in value-added. To ensure the budget is initially balanced as of 2015, we reset DGE to equal the sum of all the general revenue categories listed above, rather than its actual value in 2014, adjusted to 2015 prices. This does not require much adjustment. If we adjust to 2015 prices and adjust for population growth, inferred direct general revenue in 2015 is $2.879 trillion, and inferred direct general expenditure is $2.782 trillion.

I considered incorporating some downward adjustment in welfare expenditures. However, cash welfare is so small and so politically determined that this seemed problematic. The same is true of medical expenditures. So we assume that the population dictates welfare expenditures even as employment-to-population ratios and income increase.

Once the effects on revenue and expenditure are calculated, this value is fed back into the model as either a fiscal benefit or a cost. If a fiscal benefit, it results either in fewer net costs of incentives or in potentially a fiscal benefit for the government that the government can allocate in some way. If a fiscal cost, then either net costs of incentives go up, or, after the incentive period is over, there is an additional governmental cost. This governmental benefit or cost is assumed to be allocated identically to the financing of the incentives. But the effect of fiscal benefits or costs is assumed to be lagged one year. That is, the assumption is that at the end of each fiscal year, state and local governments take the resulting surplus or deficit and apply it to next year's budget. This avoids simultaneity problems and may be more realistic.

Avoiding Fiscal Double-Counting

The fiscal benefits and costs from the above calculations include tax revenue gained from the increased earnings and property values for local residents from this incentive package and its consequences. To avoid double-counting, these tax revenue gains must be subtracted from income.

The local income gains and losses are these:

- gains for locals from increased employment rates
- gains for locals from wage premia and their multipliers
- gains for local workers from wage increases due to tighter local labor market
- losses for local businesses from wage increases
- gains for local property owners from property value increases
- losses for local business owners from cost consequences of local property value increases
- losses for local residents from education cutbacks
- gains for local business owners who are awarded incentives

All the income gains are calculated, and then a tax rate is applied that reflects the overall tax burden estimated in the fiscal benefit section. For property value gains, the property tax increase is calculated using an effective property tax rate estimated by dividing total property tax collections in 2014 by estimated total property values in 2014.

In addition, although in the baseline we assume that all local tax and spending costs have an overall value equal to their dollar value, we also consider subtracting out some value from education to reflect that education's benefits are already counted once, in the form of increases in future earnings of students. But the baseline assumes that K–12 education would be valued by parents at cost solely for its effects in terms of free day care and its effects in developing civic values and reducing youth crime.

Adding Everything Up

Based on this calculation, we have the incentive costs. We have fiscal benefits of those costs. And we have net income gains after taxes for various groups. Finally, we have a portion of those incentive costs that are exported to nonlocal businesses.

Together, we can calculate the present value of net benefits for each group and compare those net benefits with incentive costs. We can also calculate this for each year of the 80-year simulation.

Dividing Costs and Benefits by Income Quintile

The model first produces aggregate benefit-and-cost estimates, both over the 80-year period of the simulation and in present-value terms. The model then proceeds in a top-down manner to allocate all these benefits and costs by income quintile. The allocators force the quintile numbers to add up to the all-group totals.

Incentive costs. Incentive costs are divided in the model among taxes and spending. Taxes in turn are divided between business taxes and nonbusiness taxes. Spending is divided between education spending and noneducation spending.

The direct immediate costs of increased nonbusiness taxes are assumed to be divided across income quintiles in the same way as is implied by the personal tax rates by quintile that are reported by ITEP—i.e., the ITEP rates are applied to the CBO before-tax-but-after-transfer income quintiles, and the numbers are then adjusted so that the quintile revenue figures add to the total. The direct costs of increased business taxes are first assigned only to local business taxes. They are then allocated across income quintiles based on the division of capital income by quintile in the CBO data.

For spending, we use the benefit results from the Tax Foundation to divide state and local spending by quintile (Prante 2013). We apply the quintile benefit rates from the Tax Foundation to the before-tax and after-transfer income figures in CBO.

Fiscal benefits. Fiscal benefits are allocated the same as incentive costs.

Employment rate effects. Employment rate effects are divided by CBO income quintiles by multiplying each quintile's share of before-tax-but-after-transfer income by the relative contribution of labor demand shocks on earnings that are reported in Table 2 of Bartik (1994).

Taxes on these employment rate effects are derived by first dividing earnings in this way and then multiplying by the relative personal tax rates reported in ITEP (e.g., the rate for each quintile divided by the overall rate). This is then used to divide the tax total for employment-rate effects by quintile.

Wage premia effects. Wage premia effects are divided by quintile based on each quintile's share of labor income in the CBO income quintile data. Wage premia tax effects are derived by taking these shares, multiplying by the relative personal tax rate in the ITEP data, and then adjusting the quintile numbers proportionately to force them to add up to the total.

Property value effects. Homeowner capital gains are divided up by quintile using data from the Federal Reserve, based on the Survey of Consumer Finances, of home-ownership rates and median home values by income quintile. The product of the two is used as an allocator.

The other business real estate that is owned locally is divided among quintiles based on the division of capital income across quintiles in CBO.

Property taxes are divided up identically to this division, based on the assumption of uniform property tax rates across income classes and, for that matter, classes of property.

The negative effects on local profits due to increases in the rental price of real estate are divided among different income quintiles based on each quintile's share of capital income.

Wage increase effects. Wage increases' benefits by income quintile are based on each quintile's share of labor income in the CBO data. Wage increases' costs for local business owners are divided across income quintiles based on each quintile's share of capital income.

Taxes for each of these categories for wage earners are derived by taking these income categories, multiplying by the relative personal tax rate on that quintile in ITEP, and using the product to allocate total state and local taxes on that category of income. For capital owners, we allocate the taxes by each quintile's share of capital income.

Education spending's effects on children's earnings. These effects are assumed to be divided by income quintile by CBO's estimates of the number of households with children in each income quintile. This implicitly assumes the same number of children per household in each income quintile, which is probably not correct. This method of allocation gives shares that are close to even, but tipped a bit toward the lower income quintiles.

The increased taxes on these education effects are divided among income quintiles by using this division, and then the ITEP relative quintile personal tax rates, to allocate the entire tax amount.

Incentive effects on local business owners. These local business-owner effects are divided across income quintiles based on each quintile's share of capital income in the CBO's income distribution tables. The taxes on these changes in local business owners' income combines this information with ITEP relative tax rates by income quintile, in order to allocate the overall tax collections from this type of income.

Appendix D: Assumptions about How Incentive Effects Vary with Scale, Local Characteristics, and National Incentive Competition: Their Implications for the Benefit-Cost Analysis of Incentives

In this simulation model, the effects of incentives are assumed to occur because of a constant elasticity response of business location and expansion decisions to overall business costs. This assumption is not unreasonable, as it is plausible that the percentage increase in business activity induced by cost reductions might be some constant multiple of the percentage reduction in costs.

However, this assumption has two consequences. First, within the range of business incentives that are or have been paid in the United States, there are some modest diseconomies to larger incentive scales. That is, when we double the size of incentives per incented firm, costs of incentives tend to double, but the benefits of incentives go up somewhat less than double, as the number of firms whose location or expansion decision is induced will not quite double.

Second, the simulation model assumes that this elasticity of response does not vary with the characteristics of the local area, or the intensity of the incentive competition. Obviously this affects how benefits and costs of incentives are altered in different areas, or over different time periods.

Each of these consequences of the simulation model's assumptions about incentive responsiveness will be discussed in turn in this appendix.

Diseconomies of scale of incentives

If we assume that business employment responds with a constant elasticity response to a percentage change in costs, then the "after" level of employment, E_a, compared to the before level of employment, E_b, will have the following relationship to the relative business costs in the two worlds:

(D1) $\ln(E_a/E_b) = R \times \ln(C_a/C_b)$.

R is the elasticity of long-run business activity with respect to business costs (value-added). This long-run elasticity is assumed to be −10 in this model's baseline simulations, based on the literature on how state and local business activity responds to state and local business taxes.

This is an assumed long-run relationship. If we assume that new location decisions or expansion decisions reflect this long-run relationship, then this also represents the employment in incentive firms after the incentive provision, compared to what would have occurred in an alternative world where incentives did not exist.

We manipulate Equation (D1) to get the percentage of incented firms that are induced by the incentive. In doing so, we rely on C_a being related to C_b by

(D2) $C_a = (1 - s) \times C_b$,

where s is the incentive subsidy rate as a percentage of value-added.

Combining equations (D1) and (D2) and doing some manipulations, we get

(D3) $(E_a - E_b)/E_a = 1 - (1 - s)^{(-R)}$.

Equation (D3) implies that the marginal effect of a given change in the subsidy rate on the percentage of induced location decisions among incented firms tends to decline as the subsidy rate increases. But the decline is modest at typical incentive rates. If we relabel the percentage of induced firms, $(E_a - E_b)/E_a$, as N, then we get

(D4) $dN/ds = (1 - s)^{(-R-1)}$.

If R is any number more negative than −1 (the baseline is −10, and a plausible range is from −3 to −17), the change in induced firms for a given change in the subsidy rate will tend to go up as the subsidy rate increases.

At the baseline elasticity of −10, Table D1 shows the percentage of induced firms at all incentive levels from 0.1 percent of value-added to 25.0 percent of value-added.

Table D1 How Induced or "But-For" Percentage of Incented Firms Varies with Different Present Value of Incentives as of Value-Added

Incentive as % of value-added	% of incented firms that would not have located or expanded "but for" incentive	Ratio of inducement to incentive cost, this incentive level, expressed as % of baseline incentive of 1.24% of value-added
0.1	1.0	105.2
0.2	2.0	104.7
0.3	3.0	104.3
0.4	3.9	103.8
0.5	4.9	103.3
0.6	5.8	102.9
0.7	6.8	102.4
0.8	7.7	102.0
0.9	8.6	101.5
1.0	9.6	101.1
1.1	10.5	100.6
1.2	11.4	100.2
1.3	12.3	99.7
1.4	13.2	99.3
1.5	14.0	98.8
1.6	14.9	98.4
1.7	15.8	98.0
1.8	16.6	97.5
1.9	17.5	97.1
2.0	18.3	96.7
2.1	19.1	96.2
2.2	19.9	95.8

Table D1 (continued)

Incentive as % of value-added	% of incented firms that would not have located or expanded "but for" incentive	Ratio of inducement to incentive cost, this incentive level, expressed as % of baseline incentive of 1.24% of value-added
2.3	20.8	95.4
2.4	21.6	95.0
2.5	22.4	94.6
2.6	23.2	94.1
2.7	23.9	93.7
2.8	24.7	93.3
2.9	25.5	92.9
3.0	26.3	92.5
3.1	27.0	92.1
3.2	27.8	91.7
3.3	28.5	91.3
3.4	29.2	90.9
3.5	30.0	90.5
3.6	30.7	90.1
3.7	31.4	89.7
3.8	32.1	89.3
3.9	32.8	88.9
4.0	33.5	88.6
5.0	40.1	84.8
6.0	46.1	81.3
7.0	51.6	77.9
8.0	56.6	74.7
9.0	61.1	71.7
10.0	65.1	68.8
15.0	80.3	56.6
20.0	89.3	47.2
25.0	94.4	39.9

NOTE: The rightmost column shows the ratio of the "but for" percentage to the incentive rate for that incentive level, divided by this same ratio for the baseline incentive percentage of 1.24.
It can be viewed as a rough gauge of how much benefit-cost ratios might change as we go to different incentive levels, compared to the baseline.

Most of these incentive levels vastly exceed typical incentive levels. As shown in Bartik (2017a, Table 11), average unweighted incentive rates in 2015 across the 33 states in that study ranged from 0.09 percent to 4.23 percent, with a mean of 1.42 percent and a standard deviation of about 1.08 percent.[124] The ninetieth percentile of incentives across states in 2015 was 2.91 percent. In other words, average state incentives at their max might be about three times the national average for incentives, and most state incentives are no more than twice the national average. Of course, incentives also vary over time, and as shown in Bartik (2017a, Table 39), over multiple years from 1998 to 2014 the unweighted incentive mean is 1.36 percent, with a standard deviation of 1.18

124 These incentive rates are calculated using a 20-year time horizon.

percent and a maximum of 6.05 percent. The ninetieth percentile of incentives is at 2.89 percent. Finally, incentives also vary across industries, and across 31 industries, 33 states, and 16 years from 1998 to 2013 we have an unweighted incentive mean of 1.55 percent, with a standard deviation of 1.58 percent (Bartik 2017a, Table 40). The maximum incentive rate over all these state/year/industry cells is 17.16 percent, but the ninetieth percentile is at 3.71 percent. In other words, although occasionally there may be incentives that as a percentage of value-added are over 10 percent, this is rare; for most firm location decisions, the incentive rate does not exceed three times the national mean incentive rate.

The average incentive rate used in this paper's model simulations is 1.24 percent.[125] An incentive rate of three times this would be about 3.7 percent. As shown in Table D1, at the 3.7 percent subsidy rate, the average ratio of the induced location and expansion decisions to the subsidy rate is 89.7 percent of the ratio for the baseline incentive rate of 1.24 percent used in this paper's simulations. The labor market benefits of incentives will largely be proportional to the proportion of induced decisions, while the budgetary costs and financing costs of incentives will largely be proportional to the subsidy rate. Therefore, as we triple the incentive rate from 1.24 percent to 3.71 percent (1.24 represents a rounded number, so three times the rate is not 3.72 percent), we expect most costs to triple but benefits to increase only by about a factor of 2.69 (= 3 times 89.7 percent). This will slightly reduce the benefit-cost ratios of these more intense incentives.

This pattern can be shown if we use the model to simulate the effects of incentives that are three times the baseline incentive rate of 1.24 percent (Table D2).

Comparing Table D2, Panel B, with Panel A (or main text Tables 4 and 6), the raw cost of incentives does indeed triple, from $508.5 million to $1,525.4 million. But labor market benefits only increase from $521.7 million to $1,364.8 million, which is an increase by a factor of 2.62. This factor increase is slightly lower than predicted because of the various interactions in the model between lower labor-market benefits and resulting feedback effects from changes in fiscal benefits. As a result, the "benefit-cost" ratio of incentives (equal to [net benefits + budget costs] divided by budget costs) declines moderately, from 1.223 to 1.018. Net benefits decline from $113.6 million to $28.2 million. Because net benefits in the original simulation were so closely balanced between similar gross benefits and gross costs, even minor changes in the benefit-cost ratios translate into a decline in net benefits.

Why, then, do I not choose in the main text to highlight this "finding" that the benefit-cost ratio of incentives declines as we move to higher per-firm incentive levels? My choice is determined largely because this pattern is assumed rather than shown by empirical data. The underlying elasticities are derived from the consensus of empirical studies that use data on gross state and local business taxes, and their estimated effects upon business location and expansion decisions, or long-run business activity (Bartik 1991). In Bartik (2017a), gross state and local business taxes, measured as a percentage of business value-added, in 2015 had a standard deviation of

125 As explained elsewhere in the paper, this incentive rate is calculated using an infinite time horizon and a 12 percent discount rate, whereas the incentive rates in Bartik (2017a) are calculated using a 20-year time horizon and a 12 percent discount rate.

Table D2 Benefits and Costs of an Incentive Package of Three Times Baseline

Panel A: Baseline scenario: Incentive of 1.24% of value-added (cost of $508.5 million)

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	113.6	(15.7)	11.7	56.7	(12.0)	73.0
Net local budget costs	(326.9)	(34.8)	(40.8)	(50.1)	(62.7)	(138.4)
Labor market benefits	521.7	61.1	88.9	135.8	70.0	165.9
Property-value benefits	146.6	4.6	7.1	9.6	17.3	108.0
Education cutbacks	(193.9)	(46.0)	(42.8)	(37.4)	(34.4)	(33.4)
Pure incentive cost	(508.5)					
Benefit-cost ratio	1.223					

Panel B: Incentives of three times baseline: 3.71% of value-added (cost of $1,525.4 million)

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	28.2	(83.6)	(13.2)	103.0	(81.6)	103.6
Net local budget costs	(1,018.7)	(108.4)	(127.3)	(156.2)	(195.5)	(431.3)
Labor market benefits	1,364.8	159.9	232.7	355.2	183.1	433.9
Property-value benefits	383.8	12.1	18.6	25.2	45.3	282.6
Education cutbacks	(612.9)	(145.4)	(135.2)	(118.1)	(108.8)	(105.5)
Local business effects	(88.9)	(1.9)	(2.0)	(3.1)	(5.7)	(76.1)
Pure incentive costs	1,525.4					
Benefit-cost ratio	1.018					

NOTE: All assumptions are the same as in baseline model, except incentive examined is assumed to be same time pattern as baseline, but at three times the baseline incentive's present value as a percentage of value-added of 1.24%.

1.10 percent; across 33 states and 17 years (1998–2014), gross state and local business taxes had a standard deviation of 1.18 percent. Therefore, the evidence for how cost changes affect business location and expansion decisions is derived from data on gross taxes in which almost all the variation spans ±2 standard deviations, or ±2.2 or 2.4 percent of value-added; a majority of the variation is of gross tax variation of ±1 standard deviation, or ±1.1 percent or 1.2 percent of value-added. Therefore, it seems likely that these data can be used to reasonably infer likely *average* business reaction to incentives that might be 1 to 3 percent of value-added. In addition, these studies in general do not test whether the elasticity of business responses changes significantly as business taxes or costs change from a relatively high to a relatively low level. As a result, all we really know is the average responsiveness of business to cost variation up to perhaps the 4 percent of value-added range; we do not know how it varies within this range, and we certainly don't know its variation outside that range.

Logic suggests that we would not expect to see huge variation in business responsiveness per dollar of incentive as we go from incentives of 1 percent of value-added to 4 percent of value-added. After all, all these incentives still are only a minor share of overall business costs, whether they are 1 percent or 4 percent. However, whether the effect of a three-times-larger incentive package, per dollar of costs, is 85 percent or 115 percent of the baseline incentive package is not something on which we really have true empirical knowledge. Unfortunately, because benefits and costs are so closely balanced, variation in incentive effects in this range can make a difference in whether a policy has net benefits.

One other modification should be noted. The equation (D1) as specified above only is defined if both C_a and C_b are positive numbers. But with incentives, especially incentives whose value in terms of cost reduction may be some multiple of their budget costs, it is theoretically possible that if a model user assumed some extreme values, costs after the incentive could be zero or negative. Therefore, in implementing the model, I assumed that the cost reduction due to incentives could never exceed 99.99 percent. In terms of the model for affecting marginal investment decisions, this results in maximizing the effect on the location probability at just a little bit under 100 percent.

As this points out, one finding we can be certain about in how incentive effects vary with incentive size is that the maximum effect cannot exceed a tipping effect of 100 percent. In the baseline, an incentive of 1.24 percent tips 11.70 percent of all incented firms. Multiplying the incentive by 10 or 20 times will not cause the incentive tipping effect to exceed 100 percent.

This finding suggests the following experiment: what is the maximum incentive that can be justified on a benefit-cost basis if we assume that each and every incented firm would not have located or expanded in this state or local area "but for" the incentive? This is not meant to be a realistic simulation. In the real world, for plausible values of incentives, the tipping percentage will be less than 100 percent. But this simulation helps reveal how the benefits of incentives vary with various assumptions, such as assumptions about multipliers and incentive financing, holding the tipping probability constant at 100 percent. It provides another way to compare the various policies discussed in this report.

For these comparisons, I calculate the incentive subsidy as a percentage of the present value of the incented firms' wages over an 80-year period. This present value is calculated using a social discount rate of 3 percent.

In the baseline model, the incentive considered ends up being 1.39 percent of incented firms' wages, when both the incentive and firms' wages are discounted over 80 years back to the present using a 3 percent social discount rate. In comparison, the recent Foxconn subsidy provided by Wisconsin has a likely present value, based on press reports, of 18.0 percent of this firm's wages over an 80-year period.

Table D3 reports the maximum "efficient" incentive that is conceivable under the extreme assumption that 100 percent of all incented firms' location and expansion decisions are tipped by the incentives. This is calculated by setting the tipping percentage at 100 percent, regardless of the incentive magnitude, and then cranking up the incentive scale until incentive costs are just equal to incentive benefits.

Table D3 Maximum Incentive Subsidy, as Percentage of Incented Firms' Wages Over 80 Years, That Can Have Net Benefits if Tipping Probability Is Assumed to be 100 Percent

	% of average incented job wage rate
Baseline	13.4
Cost sensitivity of −3	17.8
Cost sensitivity of −17	10.7
Multiplier of 6.0	31.9
Multiplier of 1.5	8.1
Export base of 50%	6.7
10% wage premia	17.9
10-to-1 effectiveness	13.4
Uniform incentives	13.7
Up-front incentives	13.2
100% spending-cut-financed	10.2
100% education spending financed	5.9
100% tax financed	22.3
100% business-tax financing	29.9
MC of pop 10% gt AC	10.5
MC of pop 10% lt AC	16.2
Marginal tax revenue 10% above average	15.9
Marginal tax revenue 10% less than average	10.9
Higher lfpr effects	15.8
Initial 10% UR	15.5
Locally owned firms	19.8
Locally owned nonexport	1.4
Nonlocal nonexport	0.0
10-to-1 effectiveness services to locally owned nonexport base	Infinite
10-to-1 effectiveness services with more progressive business assistance	Infinite
High effectiveness services to locally owned nonexport base that also pay 10% wage premia	Infinite
5-to-1 effectiveness services to locally owned nonexport firms	Infinite

NOTE: This table assumes 100% of incented firms would not have located "but for" the incentive. The incentive amount is then increased until the point at which net benefits hit zero.
The value of the incentive is then calculated as a percentage of the present value of wages in the incented firms over an 80-year period.
These present values are calculated at a 3% social discount rate.
For comparison, the baseline incentive in the model has a present value of 1.39% of wages over 80 years, using a social discount rate.
The recent Wisconsin Foxconn incentive has a value, from what is known now, of 18.0% of wages over 80 years.

As this table reveals, under the extreme assumption that 100 percent of incented firms' decisions are tipped, quite large incentives can be justified. Under the baseline model assumptions, incentives as large as 13.4 percent of wages can be justified. Creating jobs has large benefits. And if an incentive package truly tips the location decision, quite high incentives can be justified, even with incentives' many costs, both budgetary and through the opportunity costs of forgoing other opportunities.

On the other hand, even under these extreme assumptions, some incentive packages are too large to be justified. For example, the Wisconsin Foxconn incentives of 18.0 percent of wages are hard to justify unless one not only assumes they actually tipped the location decision, but also made some other favorable assumptions, such as assuming a very high multiplier, or assuming that the Foxconn incentive package was financed by increased business taxes.

Furthermore, if incentive packages go to firms with a low multiplier, or to nonlocal firms that are not 100 percent export-base, or are financed by reduced education spending, the maximum incentive package that can be justified is reduced to under 10 percent of wages, even under the extreme assumption that 100 percent of incented firms are tipped. These circumstances make high incentives a riskier strategy.

As mentioned, the assumption of 100 percent tipping is an extreme and unrealistic assumption. What if the tipping percentage is less than 100 percent? The main text of the report answers that question with empirically estimated tipping percentages. Alternatively, it turns out that the model is exactly linear in the tipping percentage. Therefore, if one assumed a 25 percent percentage, for example, all the figures in Table D3 could be divided by four to get a new set of maximum efficient incentive subsidy rates.

Constant Elasticity of Location Responsiveness in Different Local Areas or Different National Incentive Competition Regimes

The incentive effectiveness assumptions of the simulation model implicitly assume that the percentage of business location decisions that are induced by incentives will not vary with the characteristics of the local area, or how intense the national incentive competition is. This assumption is to a large extent driven by the paucity of relevant research. There is no relevant research showing that incentives, or for that matter state and local business taxes, have different effects on business location decisions based on the local area's characteristics, or the prevailing average national levels of incentives and business taxes. But in addition, it is not at all obvious what relationship we should expect between incentive effectiveness, and either local characteristics or national business incentive and tax competition.

Consider an area that is more economically depressed. Other things equal, the depressed area, compared to a typical area, will tend to attract fewer business location decisions. The depressed area might also find it more difficult to attract additional business locations with incentives. But it is not at all obvious that higher incentives in this depressed area will have greater or lesser effects on the "but for" percentage, compared to the average area. This depends upon the ratio of the number of businesses that are on the margin of choosing the depressed area, and therefore are successfully induced by higher incentives, to the baseline number of businesses choosing this depressed area. In turn, we need to consider how this ratio for a depressed area compares to the analogous ratio for an average local area. It is not obvious whether this ratio will be higher or lower for the depressed area, compared to the average area.

Similarly, suppose the average national level of incentives is higher. Other things equal, this means that for any given area that doesn't offer incentives, the baseline number of business location decisions attracted will be lower. It also may be the case that a given incentive level will attract fewer additional business location decisions to this area, given the tough national competition. But it not obvious that the ratio of the additional businesses attracted, to the baseline business location decisions attracted, will be higher or lower with intensive national incentive competition, versus less intense competition.

Future research might clarify how the "but for" percentage for incentives at different levels varies with local characteristics or the national context. The simulation model could accommodate new empirical estimates that revealed such variability. Any such variation could significantly change incentives' net benefits.

Appendix E: Why Incentives Aren't Simply Capitalized into Higher Property Values

In a simple model of local economies, a shock to local labor demand will simply be capitalized into higher property values. As outlined by Bartik (1991), local economic models such as the one developed by Marston (1985) assume perfect mobility of labor and capital. If a labor demand shock even temporarily affects local wages and other prices in a way that affects average worker well-being or average profits, labor and capital will quickly migrate in or out. This migration in or out will force local wages and prices to adjust in a way that will restore the original level of worker well-being and the original profit rate on capital. The only permanent effect might be a change in local property values, as more land cannot "migrate in" to a local economy.

Obviously, the models presented here do not show this perfect capitalization. As outlined in discussing the baseline scenario (Table 6 and subsequent tables), for example, the present value of change in income due to increased property values is moderate relative to other changes in income. For example, in the baseline scenario, the net present value of increased property values is $146.6 million, while the increased present value of labor market benefits is $521.7 million.

This appendix explores what assumptions are necessary for property value benefits to play more of a role. It turns out that the assumptions needed are indeed extreme.

Table E1, Panel A, assumes that the elasticity of housing prices with respect to job growth is increased to 1.038, a little more than double its baseline scenario elasticity of 0.451.

This 1.038 elasticity is close to the elasticity estimated by Saiz (2010) for a local economy such as San Jose. This higher elasticity increases property-value benefits by two-thirds, to $241.3 million. The higher property prices tend to reduce the growth of local jobs, thereby lowering labor market benefits. Labor market benefits in this "San Jose" scenario are $376.0 million, compared to $521.7 million in the baseline scenario. However, even with more inelastic housing supply, labor market benefits are still considerably greater than property value benefits.

Panel B attempts to make the labor market more market-clearing by assuming that unemployment is persistently low at 3 percent—the unemployment rate starts out at 3 percent and stays there. This reduces labor market benefits to $282.5 million. However, labor market benefits are still slightly greater than property-value benefits.

Panel C simply assumes away any labor market benefits. All new jobs go to in-migrants, with no effects in boosting local employment-to-population ratios. Job growth has no effect on wages. However, the budget consequences of paying for the job growth, through incentives, still loom large relative to property-value benefits. The budget costs of incentives, and their effects on wage losses due to education cutbacks, sum to income losses of $579.5 million (budget costs of $350.4 million plus education cutbacks of $229.1 million), which significantly exceed property-value benefits of $235.1 million.

Table E1 How the Property Capitalization Component of Incentives Changes Under Various Assumptions

Panel A: Higher housing price elasticity (San Jose scenario)

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	137.1	(15.9)	5.9	40.2	(4.0)	110.8
Net local budget costs	(264.5)	(28.1)	(33.0)	(40.5)	(50.8)	(112.0)
Labor market benefits	376.0	44.1	64.1	97.9	50.4	119.5
Property-value benefits	241.3	7.6	11.7	15.8	28.5	177.7
Education cutbacks	(161.2)	(38.2)	(35.5)	(31.1)	(28.6)	(27.8)
Local business effects	(54.5)	(1.2)	(1.2)	(1.9)	(3.5)	(46.7)

Panel B: More inelastic housing supply and persistently low unemployment

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(22.8)	(37.2)	(20.7)	4.9	(28.6)	58.9
Net local budget costs	(299.4)	(31.9)	(37.4)	(45.9)	(57.5)	(126.8)
Labor market benefits	282.5	33.1	48.2	73.5	37.9	89.8
Property-value benefits	236.8	7.5	11.5	15.5	27.9	174.4
Education cutbacks	(189.0)	(44.8)	(41.7)	(36.4)	(33.5)	(32.5)
Local business effects	(53.7)	(1.1)	(1.2)	(1.9)	(3.5)	(46.0)

Panel C: More inelastic housing supply with labor market benefits assumed away

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	(396.0)	(85.3)	(84.1)	(84.3)	(83.5)	(58.9)
Net local budget costs	(350.4)	(37.3)	(43.8)	(53.7)	(67.3)	(148.4)
Labor market benefits	0.0	0.0	0.0	0.0	0.0	0.0
Property-value benefits	235.1	7.4	11.4	15.4	27.7	173.2
Education cutbacks	(229.1)	(54.3)	(50.5)	(44.1)	(40.7)	(39.5)
Local business effects	(51.6)	(1.1)	(1.2)	(1.8)	(3.3)	(44.2)

Panel D: More inelastic housing supply with labor market benefits assumed away, most fiscal benefits assumed away

		Quintile				
Income distribution	Total	1	2	3	4	5
Quintile income share (%)	100.00	5.08	9.24	13.72	20.00	51.96
Total net	298.7	19.5	24.6	29.3	43.8	181.6
Net local budget costs	48.2	5.1	6.0	7.4	9.2	20.4
Labor market benefits	0.0	0.0	0.0	0.0	0.0	0.0
Property-value benefits	284.8	9.0	13.8	18.7	33.6	209.8

Table E1 (continued)

Income Distribution	Total	Quintile 1	2	3	4	5
Education cutbacks	28.1	6.7	6.2	5.4	5.0	4.8
Local business effects	(62.4)	(1.3)	(1.4)	(2.2)	(4.0)	(53.4)

NOTE: All numbers are in millions of dollars and are present values as of 2015. Negative numbers are shown in parentheses.
Panel A makes a single change: housing price elasticity changes from the default of 0.451, which is for a typical local economy, to 1.038, which might characterize San Jose based on Saez (2010).
Panel B lowers the local unemployment rate to a permanent 3% rate.
Panel C restores unemployment rate to baseline, but eliminates all sources of labor market benefits: local labor demand shocks have zero effects on labor force participation, unemployment, and wages.
Panel D seeks to minimize fiscal effects: incentive effects of 1.24% of costs are assumed to be accomplished by incentives that cost 1/10th as much.

Panel D assumes that the labor demand shock can be brought about relatively cheaply, through customized services of one-tenth the cost that nevertheless have the same effect as the original cash incentives. Finally, in this case, property-value benefits are the dominant effect in the calculation.

But note that Panel D makes very extreme assumptions. We must assume a low-cost labor demand shock, with all its effects reflected in in-migration, to get capitalization to dominate the net benefits. This does not appear to be the real world in which we happen to live. Local labor markets simply do not behave in this way.

REFERENCES

Akerlof, George, and Janet Yellen, eds. 1986. *Efficiency Wage Models of the Labor Market*. New York: Cambridge University Press.

Anderson, John E., and Shafiun N. Shimul. 2012. "Estimating the Income Elasticity of the Property Tax Base." *Proceedings. Annual Conference on Taxation and Minutes of the Annual Meeting of the National Tax Association* 105(November): 99–98.

Aten, Bettina H. 2006. "Interarea Price Levels: An Experimental Methodology." *Monthly Labor Review* 129: 47–61.

Barth, Erling, Alex Bryson, James C. Davis, and Richard Freeman. 2016. "It's Where You Work: Increases in the Dispersion of Earnings across Establishments and Individuals in the United States." *Journal of Labor Economics* 34(S2): S67–S97.

Bartik, Timothy J. 1990. "The Market Failure Approach to Regional Economic Development Policy." *Economic Development Quarterly* 4(4): 361–370.

———. 1991. *Who Benefits from State and Local Economic Development Policies?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

———. 1992. "The Effects of State and Local Taxes on Economic Development: A Review of Recent Research." *Economic Development Quarterly* 6(1): 102-110.

———.1993a. "Who Benefits from Local Job Growth: Migrants or the Original Residents?" *Regional Studies* 27(4): 297–311.

———1993b. *Economic Development and Black Economic Success*. Kalamazoo, MI: Upjohn Institute Technical Report 93-001.

———. 1994. "The Effects of Metropolitan Job Growth on the Size Distribution of Family Income." *Journal of Regional Science* 34(4): 483–501.

———. 2001. *Jobs for the Poor: Can Labor Demand Policies Help?* New York: Russell Sage Foundation.

———. 2005. "Solving the Problems of Economic Development Incentives." *Growth and Change* 36(2): 139–166.

———. 2010. "Bringing Jobs to People: How Federal Policy Can Target Job Creation for Economically Distressed Areas." The Hamilton Project, Discussion Paper. Washington, DC: Brookings Institution.

———. 2011. *Investing in Kids: Early Childhood Programs and Local Economic Development.* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. http://doi.org/10.17848/9780880994002.

———. 2015. "How Effects of Local Labor Demand Shocks Vary with the Initial Local Unemployment Rate." *Growth and Change* 46(4): 529–557.

———. 2016. "Labor-Demand-Side Economic Development Incentives and Urban Opportunity." In *Shared Prosperity in America's Communities*, Susan M. Wachter and Lei Ding, eds. Philadelphia: University of Pennsylvania Press, pp. 129–150.

———. 2017a. *A New Panel Database on Business Incentives for Economic Development Offered by State and Local Governments in the United States.* Report prepared for the Pew Charitable Trusts. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

———. 2017b. "New Evidence on State Fiscal Multipliers: Implications for State Policies." Upjohn Institute Working Paper No. 17-275. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

———. Forthcoming. "What Works to Help Manufacturing-Intensive Local Economies?" Report prepared for Center on Budget and Policy Priorities.

Bartik, Timothy J., and George Erickcek. 2014. "Simulating the Effect of the Tax Credit Program of the Michigan Economic Growth Authority on Job Creation and Fiscal Benefits." *Economic Development Quarterly* 28(4): 314–327.

Bartik, Timothy J., William T. Gormley Jr., and Shirley Adelstein. 2012. "Earnings Benefits of Tulsa's Pre–K Program for Different Income Groups." *Economics of Education Review* 31(6): 1143–1161.

Bartik, Timothy J., Brad Hershbein, and Marta Lachowska. 2016. "The Merits of Universal Scholarships: Benefit-Cost Evidence from the Kalamazoo Promise." *Journal of Benefit-Cost Analysis* 7(3): 400–433. https://doi.org/10.1017/bca.2016.22

Bartik, Timothy J., and Kevin Hollenbeck. 2012. "An Analysis of the Employment Effects of the Washington High Technology Business and Occupation (B&O) Tax Credit: Technical Report." Upjohn Institute Working Paper No. 12-187. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. https://doi.org/10.17848/wp12-187

Beaudry, Paul, David A. Green, and Benjamin Sand. 2012. "Does Industrial Composition Matter for Wages? A Test of Search and Bargaining Theory." *Econometrica* 80(3): 1063–1104.

———. 2014. "In Search of Labor Demand." Working paper. Vancouver, Canada: University of British Columbia.

Berger, David, Veronica Guerrieri, Guido Lorenzoni, and Joseph Vavra. 2015. "House Prices and Consumer Spending." NBER Working Paper No. 21667. Cambridge, MA: National Bureau of Economic Research.

Blanchard, Olivier Jean, and Lawrence F. Katz. 1992. "Regional Evolutions." *Brookings Papers on Economic Activity* 1992(1): 1–75.

Bruce, Donald, William F. Fox, and Mark H. Tuttle. 2006. "Tax Base Elasticities: A Multi-State Analysis of Long-Run and Short-Run Dynamics." *Southern Economic Journal* 73(2): 315–341.

Bureau of Economic Analysis. 1997. *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II).* Washington, DC: U.S. Department of Commerce.

Chetty, Raj, John N. Friedman, Nathaniel Hilger, Emmanuel Saez, Diane Whitmore Schanzenbach, and Danny Yagan. 2011. "How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR." *Quarterly Journal of Economics* 126(4): 1593–1660.

Civic Economics. 2007. *The San Francisco Retail Diversity Study*. Chicago: Civic Economics. ilsr.org/wp-content/uploads/2011/12/SFRDS-May07-2.pdf (accessed July 31, 2017).

———. 2013. *Independent BC: Small Business and the British Columbia Economy.* Report prepared for the Canadian Union of Public Employees–British Columbia. Chicago: Civic Economics.

Congressional Budget Office (CBO). 2016. *The Distribution of Household Income and Federal Taxes, 2013*. Washington, DC: Congressional Budget Office.

Cronin, Julie Anne, Emily Y. Lin, Laura Power, and Michael Cooper. 2013. "Distributing the Corporate Income Tax: Revised US Treasury Methodology." *National Tax Journal* 66, no. 1: 239-262.

Davis, Morris A., Andreas Lehnert, and Robert F. Martin. 2008. "The Rent-Price Ratio for the Aggregate Stock of Owner-Occupied Housing." *Review of Income and Wealth* 54(2): 279–284.

Diamond, Rebecca. 2013. "The Determinants and Welfare Implications of U.S. Workers' Diverging Location Choices by Skill: 1980–2000." Working paper. Palo Alto, CA: Stanford University.

Dickens, William, and Lawrence F. Katz. 1987. "Inter-Industry Wage Differences and Industry Characteristics." In *Unemployment and the Structure of Labor Markets*, Kevin Lang and Jonathan Leonard, eds. London: Basil Blackwell, pp. 48–89.

Duncan, Greg J., Pamela A. Morris, and Chris Rodrigues. 2011. "Does Money Really Matter? Estimating Impacts of Family Income on Young Children's Achievement with Data from Random-Assignment Experiments." *Developmental Psychology* 47(5): 1263–1279.

Duncan, Greg J., Kathleen M. Ziol-Guest, and Ariel Kalil. 2010. "Early-Childhood Poverty and Adult Attainment, Behavior, and Health." *Child Development* 81(1): 306–325.

Ehlen, Mark. 2001. "The Economic Impact of Manufacturing Extension Centers." *Economic Development Quarterly* 15(1): 36–44.

Federal Reserve Board. 2016, 2017. *Financial Accounts of the United States: Flow of Funds, Balance Sheets, and Integrated Macroeconomic Accounts.* Federal Reserve Statistical Release. Various quarters. Washington, DC: Board of Governors of the Federal Reserve System.

Groshen, Erica L. 1991. "Sources of Intra-Industry Wage Dispersion: How Much Do Employers Matter?" *Quarterly Journal of Economics* 106(3): 869–884.

Hamermesh, Daniel. 1993. *Labor Demand.* Princeton, NJ: Princeton University Press.

Heckman, James J., Seong Hyeok Moon, Rodrigo Pinto, Peter A. Savelyev, and Adam Yavitz. 2010. "The Rate of Return to the High/Scope Perry Preschool Program." *Journal of Public Economics* 94(1–2): 114– 128.

Helms, L. Jay. 1985. "The Effect of State and Local Taxes on Economic Growth: A Time Series–Cross Sectional Approach." *Review of Economics and Statistics* 67(4): 574–582.

Hollenbeck, Kevin. 2008. "Is There a Role for Public Support of Incumbent Worker On-the-Job Training?" Upjohn Institute Working Paper No. 08-138. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. http://dx.doi.org/10.17848/wp08-138.

Holzer, Harry J., Richard N. Block, Marcus Cheatham, and Jack H. Knott. 1993. "Are Training Subsidies for Firms Effective? The Michigan Experience." *Industrial and Labor Relations Review* 46(4): 625–636.

Howard, Greg. 2017. "The Migration Accelerator: Labor Mobility, Housing, and Aggregate Demand." Job market paper. Cambridge, MA: Massachusetts Institute of Technology, Department of Economics.

Hoyt, William H., Christopher Jepsen, and Kenneth R. Troske. 2008. "Business Incentives and Employment: What Incentives Work and Where?" Working Paper No. 2009-02. Lexington, KY: University of Kentucky, Institute for Federalism and Intergovernmental Relations.

Huh, Kil, Jeff Chapman, Chaaron Pearson, Josh Goodman, Melissa Maynard, Alison Wakefield, Mirielle Burgoyne, Jasmin Griffin, John Hamman, and Jim Pagels. 2017. *How States Are Improving Tax Incentives for Jobs and Growth: A National Assessment of Evaluation Practices*. Report. Washington, DC: Pew Charitable Trusts.

Institute on Taxation and Economic Policy (ITEP). 2015. *Who Pays? A Distributional Analysis of the Tax System in All Fifty States.* Washington, DC: Institute on Taxation and Economic Policy.

Jackson, C. Kirabo, Rucker C. Johnson, and Claudia Persico. 2016. "The Effects of School Spending on Educational and Economic Outcomes: Evidence from School Finance Reforms." *Quarterly Journal of Economics* 131(1): 157–218. doi: 10.1093/qje/qjv036

Jarmin, Ronald S. 1998. "Manufacturing Extension and Productivity Dynamics." Discussion Paper No. 98-8. Washington, DC: U.S. Census Bureau.

———. 1999. "Evaluating the Impact of Manufacturing Extension on Productivity Growth." *Journal of Policy Analysis and Management* 18(1): 99–119.

Jensen, Nathan. 2017. "Exit Options in Firm-Government Negotiations: An Evaluation of the Texas Chapter 313 Program." Working paper. Washington, DC: Washington Center for Equitable Growth.

Katz, Lawrence F., and Lawrence H. Summers. 1989. "Industry Rents: Evidence and Implications." *Brookings Papers on Economic Activity: Microeconomics* 1989: 209–290.

Kline, Patrick, and Enrico Moretti. 2013. "Local Economic Development, Agglomeration Economies, and the Big Push: 100 Years of Evidence from the Tennessee Valley Authority." *Quarterly Journal of Economics* 129(1): 275–331.

Krueger, Alan B. 2003. "Economic Considerations and Class Size." *Economic Journal* 113(485): F34–F65.

LeRoy, Greg, Carolyn Fryberger, Kasia Tarczynska, Thomas Cafcas, Elizabeth Bird and Philip Mattera. 2015. *Shortchanging Small Business: How Big Businesses Dominate State Economic Development Incentives.* Report. Washington, DC: Good Jobs First.

Marston, Stephen T. 1985. "Two Views of the Geographic Distribution of Unemployment." *Quarterly Journal of Economics* 100(1): 57–79.

Mitchell, Stacy. 2007. *Big-Box Swindle: The True Cost of Mega-Retailers and the Fight for America's Independent Businesses.* Boston, MA: Beacon Press.

Moore, Mark A., Anthony E. Boardman, Aidan R. Vining, David L. Weimer, and David H. Greenberg. 2004. "Just Give Me a Number! Practical Values for the Social Discount Rate." *Journal of Policy Analysis and Management* 23(4): 789–812. doi: 10.1002/pam.20047.

Moretti, Enrico. 2003. "Human Capital Externalities in Cities." NBER Working Paper No. 9641. Cambridge, MA: National Bureau of Economic Research.

———. 2004. "Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Sectional Data." *Journal of Econometrics* 121(2004): 175–212. doi: 10.1016/j.jeconom.203.10.015

———. 2010 "Local Multipliers." *American Economic Review* 100(2): 373–377. doi: 10.1257/aer.100.2.373.

———. 2012. *The New Geography of Jobs*. New York: Houghton Mifflin Harcourt.

Orszag, Peter, and Joseph Stiglitz. 2001. "Budget Cuts vs. Tax Increases at the State Level: Is One More Counter-Productive Than the Other during a Recession?" Center on Budget and Policy Priorities Policy Brief. Washington, DC: Center on Budget and Policy Priorities.

Persky, Joseph, Daniel Felsenstein, and Virginia Carlson. 2004. *Does "Trickle Down" Work? Economic Development Strategies and Job Chains in Local Labor Markets.* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Phillips, Joseph M., and Ernest P. Goss. 1995. "The Effect of State and Local Taxes on Economic Development: A Meta-Analysis." *Southern Economic Journal* 62(2): 320–333.

Phillips, Andrew, Caroline Sallee, and Charlotte Peak. 2016. *Total State and Local Business Taxes: State-by-State Estimates for Fiscal Year 2015.* Ernst and Young report for Council on State Taxation. Washington, DC: Council of State Taxation.

Poterba, James M., and Lawrence H. Summers. 1995. "A CEO Survey of U.S. Companies' Time Horizons and Hurdle Rates." *Sloan Management Review* 37(1): 43–53.

Prante, Gerald. 2013. *A Distributional Analysis of Fiscal Policies in the United States, 2000–2012*. Tax Foundation Working Paper No. 9. Washington, DC: Tax Foundation. https://taxfoundation.org/article/distributional-analysis-fiscal-policies-united-states-2000-2012 (accessed July 31, 2017).

Saiz, Albert. 2010. "The Geographic Determinants of Housing Supply." *Quarterly Journal of Economics* 125(3): 1253–1296.

Schrock, Greg. 2015. "Remains of the Progressive City? First Source Hiring in Portland and Chicago." *Urban Affairs Review* 51(5): 649–675.

Shuman, Michael. 2015. *The Local Economy Solution: How Innovative, Self-Financing "Pollinator" Enterprises Can Grow Jobs and Prosperity.* White River Junction, VT: Chelsea Green Publishing.

Social Security Administration, Board of Trustees (SSA Trustees). 2016. *The 2016 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds*. 114th Cong., 2nd Sess. Washington, DC: Social Security Administration.

Suarez Serrato, Juan Carlos, and Philippe Wingender. 2016. "Estimating Local Fiscal Multipliers." NBER Working Paper No. 22425. Cambridge, MA: National Bureau of Economic Research.

Suarez Serrato, Juan Carlos, and Owen Zidar. 2016. "Who Benefits from State Corporate Tax Cuts? A Local Labor Market Approach with Heterogeneous Firms." *American Economic Review* 106(9): 2582–2624.

Van Dijk, Jasper Jacob. 2018. "Robustness of Econometrically Estimated Multipliers Across Different Methods and Data." *Journal of Regional Science* 58(2): 281–294.

Wasylenko, Michael J. 1997. "Taxation and Economic Development: The State of the Economic Literature." *New England Economic Review* 1997(March/April): 37–52.

Weber, Rachel. 2002. "Do Better Contracts Make Better Economic Development Incentives?" *Journal of the American Planning Association* 68(1): 43–55.

———. 2007. "Negotiating the Ideal Deal: Which Local Governments Have the Most Bargaining Leverage?" In *Reining in the Competition for Capital,* Ann Markusen, ed. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, pp. 141–160.

Zidar, Owen. 2017. "Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment." Working paper. Chicago: University of Chicago, Booth School of Business; and Cambridge, MA: National Bureau of Economic Research.